BILLET D'ÉTAT

XXIV
2009

TUESDAY 29th SEPTEMBER 2009

Volume 2

Printed by Image Group, Caslon Court, Pitronnerie Road, St Peter Port, Guernsey GY1 3NE

Price £2.50

PUBLIC SERVICES DEPARTMENT

GUERNSEY AIRPORT – PAVEMENTS REHABILITATION

The Chief Minister
Policy Council
Sir Charles Frossard House
La Charroterie
St Peter Port

30th July 2009

Dear Sir

1. Executive Summary

1.1. An operational airport is an essential and highly strategic part of the Island's infrastructure. Its efficient operation is key to many aspects of Island life.

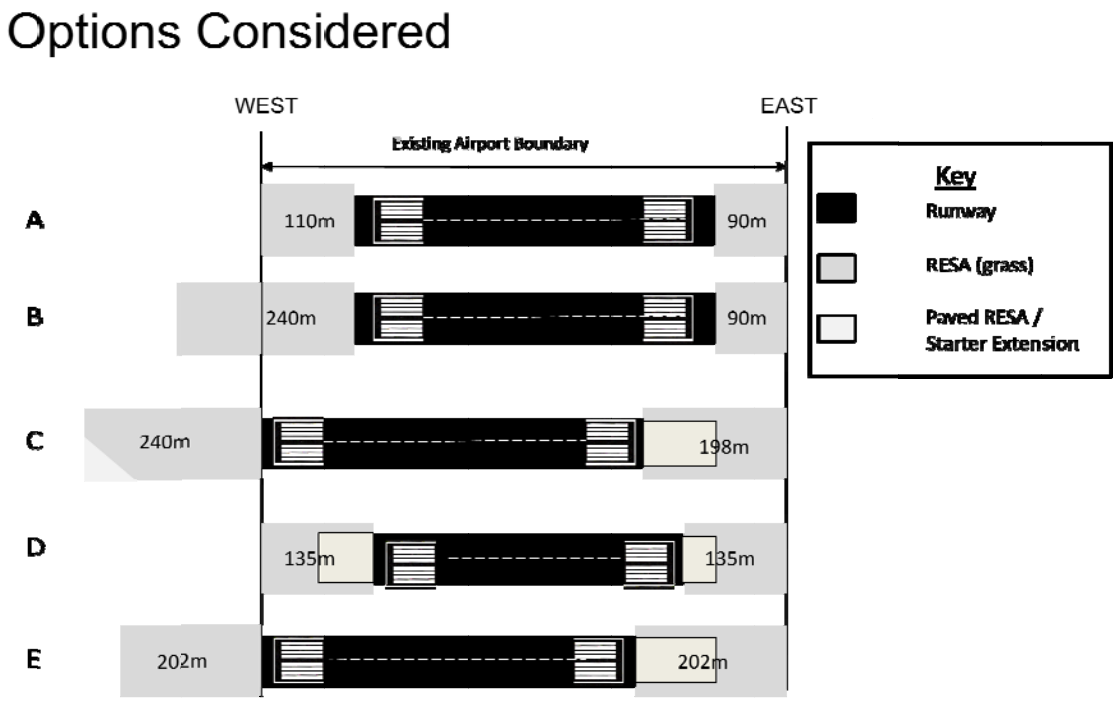
1.2. This report concerns the rehabilitation of Guernsey Airport's pavements (which include the runway, taxiways and aprons) and is the second report to be brought to the States of Deliberation on this subject in the past twelve months, the first being a report dated 31st October 2008, which formed part of Billet XVIII of December 2008.

1.3. The deterioration of the runway and associated airfield surfaces has reached a critical stage and work to rehabilitate these surfaces must proceed without delay. Failure to act soon could result in the failure of the runway substructure, thereby necessitating complete reconstruction of sections at a cost far higher than currently set out in this report.

1.4. Significantly, not to address the airport safety and structural issues poses a serious risk to the economic and social wellbeing of the community.

1.5. Although the works required are to be seen as a package, most of the public debate has focussed on the runway and the associated Runway End Safety Areas (RESAs). In this respect a total of five alternative runway schemes have been considered (see figure below, "Options Considered"). Of these schemes only two are currently acceptable from a regulatory assessment (Options "C" and "E"). Of the three remaining options, "Option A" with an adaptation using an arrestor bed material, EMAS (Engineered Materials Arrestor System), may be technically acceptable at some point in the future, however at a high cost.

1.6. The following diagram shows the five options considered. A larger version of this diagram can be found after paragraph 7.2.



1.7. The previous report submitted to the States in December 2008 detailed the Department's proposals for the rehabilitation of the pavements at the airport. It demonstrated that this is an interwoven package of elements but for ease the relative scale of the individual elements is shown below (based on a spend of approximately £81m including contingencies):

- Resurfacing of the runway including re-profiling 27%
- Improvements to foul and surface water drainage 19%
- Reconstruction of aprons 17%
- Resurfacing and realignment of taxiways 13%
- Replacing airfield ground lighting system 7%
- Design fees, land purchase and allowances 7%
- Lengthening of Runway End Safety Areas (RESAs) 6%
- Re-profiling of the runway strip 4%

1.8. The Public Services Department's previous report made it clear that it was not convinced that an extension of the runway to 1700 metres was justified at the present time. The Policy Council, at the request of the Commerce and

Employment Department, instructed York Aviation to conduct a study on the economic impact of not extending the runway to 1700 metres at some point in the future. York's report has come back in support of the Public Services Department's viewpoint, that while it might be desirable in the future, a runway extension is not currently necessary.

1.9. After careful consideration, the Public Services Department is recommending to the States the approval of "Option C" at an estimated cost of £80.9m as being the optimum solution. This has been confirmed as being a reasonable basic package of measures that will restore the structural and engineering integrity of the airport and address a range of safety issues, bringing it up to acceptable current standards. It also provides the Island with the ability to have the runway extended to the east at some time in the future should this be deemed necessary.

2. Contents

3. Glossary of Terms

Accelerate – Stop Distance Available (ASDA)	The distance from the point on the surface of the aerodrome at which the aeroplane can commence its take-off run to the nearest point in the direction of take-off, at which the aeroplane cannot roll over the surface of the aerodrome and be brought to rest in an emergency without the risk of accident.
Aircraft Classification Number (ACN)	The ACN is a single unique number expressing the relative effect of an aircraft on a pavement for a specified subgrade strength.
Aeronautical Ground Light (AGL)	Any light specifically provided as an aid to air navigation, other than a light displayed on an aircraft, including lights specifically provided at an aerodrome as an aid to the movement and control of aircraft and of those vehicles which operate on the movement area.
Aircraft Stand	A designated area on an aerodrome intended to be used for parking an aircraft.
Apron	A defined area on a land aerodrome provided for the stationing of aircraft for the embarkation and disembarkation of passengers, the loading and unloading of cargo, and for parking.
Arrestor Bed; Arrestor System	A material (such as EMAS) designed to bring an overrun aircraft to a stop more quickly than a traditional grass RESA.
Cleared and Graded Area (CGA)	The part at the end of the Runway Strip cleared of all obstacles except for minor specified items and graded, intended to reduce the risk of damage to an aircraft running off the runway.
Clearway	An area at the end of the take-off run available and under the control of the aerodrome licensee, selected or prepared as a suitable area over which an aircraft may make a portion of its initial climb to a specified height.
Critical Area	An area of defined dimensions extending about the ground antennae of a precision instrument approach equipment within which the presence of vehicles or aircraft will cause unacceptable disturbance of the guidance signals.

Declared Distances	The collective term for various technical measurements of the runway. Examples of Declared Distances are ASDA, LDA, TODA and TORA.
EMAS	Engineered Materials Arrestor System. Blocks of aerated concrete which are laid flat on an extended runway pavement and are designed to bring an overrun aircraft to a stop more quickly than on traditional grass RESA.
Glide-path	The path of descent of an aircraft toward the runway delineated by a signal and/or light (PAPI) that directs the pilot in landing the craft. The gradient varies depending on the airfield. The standard glide-path is three degrees.
Landing Distance Available (LDA)	The distance from the point on the surface of the aerodrome above which the aeroplane can commence its landing, having regard to the obstructions in its approach path, to the nearest point in the direction of landing at which the surface of the aerodrome is incapable of bearing weight of the aeroplane under normal operating conditions or at which there is an obstacle capable of affecting the safety of the aeroplane.
Low Visibility Procedures (LVP's)	Defines aircraft operations at aerodromes during reduced visibility or low cloud conditions. Reduced visibility can present additional hazards to the aircraft and to other aerodrome users, as the ability of air traffic service staff, pilots, vehicle drivers and other personnel to identify hazards and to take remedial action in a timely manner becomes limited.
Overrun	An aviation incident where an aircraft fails to come to a stop on the runway and runs on beyond the end of the runway, usually into the RESAs.
Passenger Movement	A typical measure of airport passenger numbers. One movement represents a single passenger journey. Two movements is equivalent to one return flight.
Precision Approach Path Indicator (PAPI)	Precision Approach Path Indicator (PAPI) is a light system positioned beside the runway that consists of two, three, or four boxes of lights that provide a

	visual indication of an aircraft's position on the glidepath for the associated runway.
Runway	A defined rectangular area, on a land aerodrome prepared for the landing and take-off run of an aircraft along its path.
Runway End Safety Area (RESA)	An area symmetrical about the extended runway centreline and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.
Runway Strip	A protected area located around a runway which is designed to reduce the risk of damage to any aircraft using or overflying the runway.
Starter Extension	The provision of a paved surface which increases declared distances thereby giving an aircraft taking off some additional benefit in terms of safety and payload.
Shoulder	An area adjacent to the edge of a paved surface so prepared as to provide a transition between the pavement and the adjacent surface for aircraft running off the pavement.
Stopway	A defined rectangular area beyond the end of the TORA, suitably prepared and designated as an area in which an aeroplane can be safely brought to a stop in the event of an abandoned take-off.
Take-off Distance Available (TODA)	Either the distance from the point on the surface of the aerodrome at which the aeroplane can commence its take-off run to the nearest obstacle in the direction of take-off projecting above the surface of the aerodrome and capable of affecting the safety of the aeroplane, or one and one half times the take-off run available, whichever is the less.
Take-off Run Available (TORA)	The distance from the point on the surface of the aerodrome at which the aeroplane can commence its take-off run to the nearest point in the direction of take-off at which the surface of the aerodrome is incapable of bearing the weight of the aeroplane under normal operating conditions.

Taxiway	A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another.
Taxiway Strip	An area of specified dimension enclosing a taxiway and intended to protect aircraft operating on the taxiway and to reduce the risk of damage to an aircraft running off the taxiway.
Threshold	The beginning of that portion of the runway available for landing.

4. Introduction

4.1. Any substantive rehabilitation works to the airfield pavements require that the airport operator also addresses any aspects of the airfield which fall below standards of safety acceptable to the regulator. In Guernsey this includes the Runway End Safety Areas (RESAs) which run to the boundary of the airfield and reduce the risk of damage to an aircraft in the event of an overrun or undershoot. In order for the RESAs to be increased to a length acceptable to the Director of Civil Aviation (the regulator in the Guernsey context), some extension of the airport boundary will be required (in the absence of EMAS becoming acceptable to the regulator).

4.2. The extension of the RESAs is not optional. The Director of Civil Aviation (DCA) requires that as part of the runway rehabilitation project, the issue of the currently inadequate RESAs be addressed. Failure to do so may result in the DCA restricting the runway declared distances. This would also be considered as an option in the event of an overrun incident in the meantime, whilst we await completion of the planned rehabilitation works. This would impact on larger aircraft currently operating from the airport including the vast majority of those operating direct services to the United Kingdom. Further information on RESA requirements can be found at Section 9 of this report.

4.3. In consideration of the Public Services Department's earlier States Report on the pavements project, at its December 2008 meeting, the States of Deliberation resolved "to sursis the article until the March 2009 meeting of the States". This decision was made at a time when the capital prioritisation debate was expected to take place in March; however this debate eventually took place in June 2009 when the project, at a cost of £84.5m, was agreed as part of the recommended Priority 1 Capital Prioritisation Programme (Billet IX, 6 March 2009, Programme C, Section 6 and Resolutions, 26 June 2009).

4.4. This report effectively supersedes the December report, with the effect that the December report will not be represented to the States for debate as a specific item.

4.5. States Members were asked to note the report at the December 2008 meeting, but it became apparent during debate that some felt that other proposals, specifically in respect of the Department's 'baseline' scheme for the composition and length of the runway, should be considered. States Members supported a sursis placed by Deputy Kuttelwascher to this effect and the Public Services Department began a period of consultation with deputies.

4.6. The debate which took place in the States in December and the subsequent feedback provided by deputies have been considered by the Public Services Department in formulating a number of options as presented in this report.

4.7. Throughout this process the Department has been consulting with the DCA who in turn has received advice from the CAA (Civil Aviation Authority) and has considered the ICAO (International Civil Aviation Organisation) Standards and Recommended Practices concerning the feasibility and acceptability of alternative options.

4.8. The main item of contention was the runway, in particular its length including the provision of RESAs. The main issues of concern can be summarised as:

- Cost
- Land Use (including environmental impact of any increased RESA)
- Compliance with Civil Aviation Authority (CAA) / International Civil Aviation Organisation (ICAO) regulations

4.9. The Department's consultants on the project, RPS, have been asked to evaluate a number of schemes which have been suggested as a result of the consultation with deputies. The work done by RPS since the December 2008 debate has been documented in its Supplementary Report which is attached at **Appendix 1**. The key points of the report are summarised in paragraph 8.2 of this report.

4.10. A separate aviation consultant (Halcrow Ltd) was employed to investigate which of the options were compliant from a safety perspective and more generally to provide an audit of the degree of compliance with civil aviation standards of the Department's original proposals. Halcrow's report endorses the proposals of the original baseline scheme "Option E" from a safety and compliance perspective and also offers support to "Option C" which it anticipates will be acceptable to the regulator. A copy of Halcrow's report is attached at **Appendix 2** and a summary of Halcrow's findings is provided in paragraphs 8.3-8.20 of this report.

4.11. The Policy Council, at the request of the Commerce and Employment Department, instructed York Aviation to conduct a study on the economic impact of not extending the runway to 1700 metres at some point in the future. York's report has come back in support of the Public Services Departments viewpoint, that while it might be desirable in the future, a runway extension is

not currently necessary. York concluded that, as an extension was unlikely to generate any significant growth in air travel to and from the Island at the present time, the significant expense of a runway extension could not be justified. A key recommendation from York was that the works to the runway should be "future-proof" which aligns with the Department's preferred "Option C". The York Aviation report can be found at **Appendix 3** and a summary of the report is given in paragraphs 8.21 to 8.26 of this report.

4.12. The findings of both the Halcrow and York Aviation reports support the Public Services Department's preferred "Option C." This option would also be acceptable to the regulator specifically in the way that it improves the RESA provision at both ends of the runway.

4.13. Some recent work has been carried out by RPS into the feasibility of using material on the ground at the end of the runway that would have the effect of rapidly slowing down any aircraft that enters it. This is referred to as an arrestor system and the one produced for airfield activities is called EMAS (Engineered Materials Arrestor System).

4.14. Potentially, such material could replace part of the RESAs at either end of the runway and therefore avoid or reduce any extension of the airport boundary to either the east or the west. This technology is yet to gain the approval of the CAA and is only installed at a single airfield in Europe (being primarily a technology used in the USA). Although work to investigate the use of this product in Europe and the United Kingdom is ongoing, there is no guarantee if or when the CAA or ICAO will approve this technology as a replacement for RESAs, nor what conditions might be imposed on its use.

4.15. The current deteriorating condition of the runway is such that the States does not have the luxury of waiting for this technology to be approved for use at some point in the future. Nonetheless the Department has sought advice on the comparative cost of EMAS, just in case the rules change and the relevant authorities were prepared to agree its use. The costs of installation, maintenance and repair are of such a magnitude that the Department recommends that EMAS does not form part of the proposals for the pavements rehabilitation project. There is a good chance that the CAA and ICAO will develop a policy on the use of EMAS within the next twelve months. However, until such a policy is enunciated by a recognised aviation safety authority, the DCA could not approve the use of EMAS as providing any additional credit towards RESA provision than is currently granted in the CAA guidelines (CAP 168)[1].

4.16. In summary the additional cost and operational difficulties associated with the use of EMAS combined with the urgency of the current works mean that the Public Services Department is unable to recommend "Option A" with EMAS to the States. The two remaining options ("B" and "D") are not acceptable from a

[1] CAP 168 – Licensing of Aerodromes, Civil Aviation Authority (December 2008): http://www.caa.co.uk/docs/33/CAP168.pdf

regulatory perspective. "Option B" could become acceptable with an adaptation using EMAS at the eastern end of the runway only. However both "Option B" and "Option D" in their current form are not acceptable from a regulatory perspective because they do not satisfactorily address the RESA issue.

4.17. The costs of the compliant options for all the works (see 1.7 above) have been calculated as follows[2]:

"Option C":	£80.9m
"Option E":	£81.1m
[Non-compliant "Option A" (with the use of EMAS)	£90.5m]

4.18. The essential difference between "Option C" and "Option E" is the provision of a longer RESA to the west. On that basis it might appear that the cost differentials between Options "C" and "E" are relatively minor. By way of further explanation it should be noted that "Option E" requires the runway threshold to be moved 5 metres further west than "Option C" (in order to accommodate a 202 metre RESA at the eastern end). These 5 metres of additional paved surface are more costly to provide than the additional 38 metres of grass RESA as proposed in "Option C", hence the relatively minor cost difference between these options.

4.19. Under Options "C" and "E", the amount of fill material required is reduced to negligible quantities when compared to the original "baseline" scheme and will dramatically reduce the number of vehicle movements to and from site during the construction phase. There would however be a requirement for net import of material under "Option A" with the use of EMAS, but nothing like the quantities originally envisaged. The Department accepts that there may be a requirement to undertake some repairs to the Island's road network as a result of increased vehicle movements and will allocate some of its project contingency to fund such repairs.

4.20. Estimates on all options have identified further common contingency sums that have had to be added to the original "baseline" cost of £84.5m identified in the December 2008 report. This is as a result of advancement of the design in the intervening period, although overall the project budget for Options "C" and "E" has reduced from the original estimate. The contingency sums added include pollution control - £4m; provision for three additional Air Traffic Control staff on a temporary basis during the apron works – £240,000; and an additional sum for professional fees to accommodate detailed redesign and any necessary additional work - £300,000. It should also be noted that there have been reductions in estimates for building inflation and reductions in quantities of fill material required for the project which have led to savings over original estimates.

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[2] All costs allow for contingencies. For further information, please refer to the RPS Supplementary Report, Section 12.

4.21. "Option C" is being proposed as the Public Services Department's preferred option due to its current acceptability to the regulator and its ability to be upgraded in future to accommodate a runway extension, should this be deemed necessary at some point in the future. "Option C" is also the lowest-priced of the compliant options. Taking all of the research into account, the Department has found "Option C" to be the most cost-effective and economically advantageous long-term solution for Guernsey's airport runway.

4.22. It is hoped that all the further work which has been undertaken will enable the States to concur with the recommendation of the preferred "Option C" so that the Department can progress the essential rehabilitation of the airport pavement surfaces without further delay.

4.23. The Department is advised that it is highly unlikely that a proposal to provide an interim temporary overlay would be approved by the regulator. It would in any case incur abortive costs running into several millions of pounds. Such costs would have to include replacement of the current runway centreline lights as the existing units cannot be lifted to accommodate an overlay.

4.24. A proposal to provide a temporary overlay would be considered as substantive work on the airfield and the DCA would require that the RESA provision should be addressed as part of any substantive works to the runway. Therefore it can be seen that it is not possible to address the condition of the runway without also addressing the RESAs.

5. Background

Previous Billet

5.1 The December 2008 Billet XVIII documented a range of issues relating to the runway, taxiways and aprons at Guernsey Airport and explained in some detail why it was necessary to carry out major works to bring these up to current aviation standards.

5.2 It was also explained that civil aviation regulators require that when any major repairs are planned, an airport must seek to rectify any aspects which fall below modern aviation standards, commonly called 'non-compliances'.

Previous Debate

5.3 When the proposals came for debate in December 2008, certain concerns were expressed which were principally to question whether the proposals which had been referred to as "baseline" were in practice the minimum that could be carried out which would meet the requisite safety standards and also whether the States should be given the opportunity to decide to include options which, although possibly highly desirable, were not strictly essential.

5.4 Debate on a sursis proposed by Deputy Kuttelwascher resulted in the States:

- Resolving to sursis the Article until the March 2009 meeting of the States
- Agreeing to a short delay in the consideration of the Article to enable the Public Services Department to report back to the States, after consulting the UK Civil Aviation Authority, concerning the feasibility, acceptability and costs of alternative options

5.5 Even though the original December 2008 report was not seeking any formal decision, States Members approved the sursis to defer discussion on the proposals and gave a very clear steer to the Public Services Department to explore further options, which the Department has now done.

5.6 The updated and reassessed proposals are set out in this latest report, which effectively supersedes the original December report, albeit that the earlier document remains useful for reference purposes.

5.7 Because considerable detail was contained in the previous report, reference will be made to it in this document but the contents are not restated in full. This report will instead focus on the main areas of concern which have been highlighted in paragraph 6.6.

5.8 There is general consensus that a significant renovation and rehabilitation project is required at the airport. It has also been adjudged that certain aspects of the proposals are not being disputed to any significant extent. These were described in full in the previous report (Billet XVIII, 2008: Project Scope, Section 3.10) and a list of items included in the project scope is attached at **Appendix 4** of this report. In summary the elements of the project are as follows:

- The gradient of the runway and the gradient of the ground either side of the runway should meet with current aviation standards so that if a plane veers off the runway it is able to move off the hard surface on to the adjoining grass with the minimum risk of damage to the aircraft or its occupants. Along its length the runway also has a significant dip towards the western end which is outside the tolerances ordinarily acceptable in terms of civil aviation safety standards. The dip does not have to be removed entirely but the whole length of the runway does need to be made significantly flatter than at present in order to achieve an overall higher standard of vertical alignment.
- The need to provide extended Runway End Safety Areas (RESAs) to meet as closely as practicable (and acceptable) the current Civil Aviation Authority (CAA)/International Civil Aviation Organisation (ICAO)

requirements and to provide mitigation if the full requirements cannot be achieved.

- That the aircraft parking areas (aprons) need to be renovated to be of sufficient strength to cope with the aircraft using them. The deteriorating strength of the existing concrete, the current patching of certain areas in asphalt and the increased use in recent years of metal plates to cover areas of weakness and flaking concrete is not an acceptable medium or long-term option.

- The taxiways (the lengths of macadam that join the main apron/parking area to the runway) need to be renovated to bring them to the necessary load bearing capacity for modern aircraft.

- The need to upgrade and replace the airfield ground lighting and approach lights. The equipment has reached the end of its useful life and is difficult to maintain. The runway centreline lights are incompatible with 'lifting rings' which would be required when the surface of the runway is overlaid and reprofiled.

- The need to install appropriate land drainage and foul drainage systems to ensure no contaminants from the airfield operation can find their way into the streams which run from this area down to St Saviour's Reservoir.

- Miscellaneous items including foundations for security huts, security fencing and taxiway improvements near the Aero Club, etc.

- Contingency sums including allowances for accuracy and building inflation, 10% construction contingency, professional fees, allowances for downtime due to emergency flights, land purchase requirements and provision for nose in push back parking during construction.

6. Action Taken Since Previous Debate

Consultation with Deputies

6.1 The Public Services Department was aware that although there had been a very full debate on the sursis, a number of States Members did not express their views as they were waiting for the main debate. The Department therefore took the opportunity to write to all States Members and seek their views on the substantive proposals.

6.2 Twelve written submissions were received as a result of the consultation exercise. The feedback which has been received very much echoes and builds upon the points made during the December 2008 States debate.

6.3 In addition, Deputy Kuttelwascher had previously submitted alternative proposals. In light of his aviation experience, he was invited to attend Public

Services Department meetings to discuss aspects of the pavements project, and has already attended a number of Board meetings for this purpose.

Consultation Summary

6.4 The Board paid careful consideration to all of the suggestions which had been put forward.

6.5 As outlined above, the issues of concern, almost without exception, related to the work planned at the western end of the runway, the most significant and consistent concerns being the impact of the RESA improvements at the western end.

6.6 There emerged three issues which are of particular concern to States Members. These are:-

- Questions over the length and type of Runway End Safety Areas, and in particular at the western end where the St Pierre du Bois Douzaine and a number of local residents have raised concerns.
- Questions over whether the inclusion of starter extension strips at each end of the runway are truly necessary. The addition of such hard-surfaced areas has been suggested by some as being an extension of the runway without it properly being described as such.
- Calls to progress with a 1700 metre runway immediately upon completion of the "baseline" works as proposed and as a second phase of civil works.

Assessment Criteria

6.7 The Department considered all the feedback received and in recognition that it was neither practical nor value for money to examine in detail every conceivable option, it took note of the suggestions put forward and applied a relatively simple set of criteria to assess whether:-

i. The airport would be able to safely accommodate those aircraft currently being used regularly by existing operators, without undue operational limitations and to consider the impact on future aircraft types that are compatible with the current runway length (1463 metres).

ii. There was a realistic prospect of presenting an adequate safety case with the proposals to satisfy the requirements of the regulator, even though the proposals might not be fully compliant with all the relevant Civil Aviation regulations and guidelines (the Halcrow report was commissioned to verify the adequacy of the proposals with regard to safety/compliance).

iii. The proposals would provide a value for money solution.

iv. Given the significant level of disruption that major works would cause, that the proposals would represent at least a medium term solution and would offer some degree of "future-proofing".

v. The proposal would be feasible in respect of the land area which would be required. The impact of the proposal on land take was also assessed.

6.8 These tests were applied to the range of submissions received. As a result, five alternative proposals emerged (including the Department's original "baseline" proposal) which either merited further more detailed consideration and presentation to the States or a clear comment and explanation as to why they should not be considered any further.

7. Options for Consideration

7.1 The proposals have been summarised as Options "A" to "D", with "Option E", the original "baseline" design scheme (slightly modified to remove a starter extension).

A. Simple overlay of the current runway with the existing land-based RESAs. As an alternative, land-based RESAs could be enhanced with arrestor beds (EMAS).

B. Provide a full 240m RESA at the west end, with only the existing 90m RESA at the east; without offsetting the runway threshold further west. The logic being that a full RESA is more likely required at the western end of the runway, given the less favourable weather conditions when the wind is westerly.

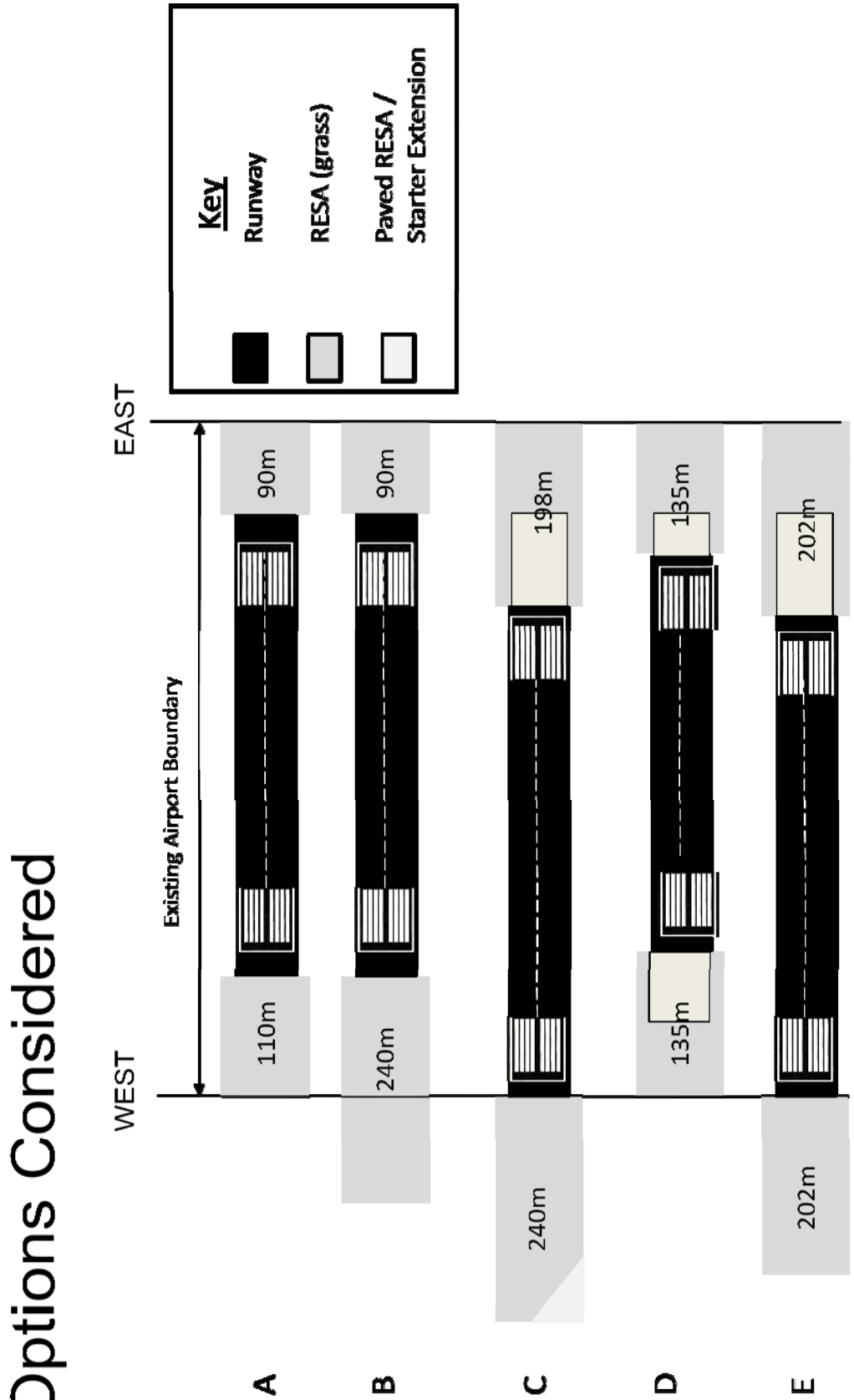
C. An option providing a 240m RESA at the western end (albeit slightly clipped) with a 198m RESA at the east.

D. Providing increased RESAs (approx 135m) within the existing airport boundary, with a corresponding reduction of the runway landing distance.

E. The original "baseline" scheme with the removal of the western end starter extension. This would enable the western embankment to shelve to a lower point than had been previously recommended.

7.2 A diagram showing the variations of these options can be seen overleaf. More detailed diagrams showing the options are included within the RPS Supplementary Report (Section 2: Introduction) attached at **Appendix 1**.

Options Considered



7.3 Before undertaking a formal evaluation of these five options, the Public Services Department asked Halcrow Group Ltd to validate which were likely to be compliant from a regulatory perspective (see paragraphs 8.3-8.20). In this way, the Department was endeavouring to limit the time and costs associated with undertaking further evaluation of options which would not be able to be progressed as they would not be acceptable to the regulator. Halcrow indicated (as expected by the Department) that only Options "C" and "E" would be acceptable. In addition and following further discussion with the CAA, some additional costs were incurred in examining "Option A", with an arrestor bed provision.

7.4 The Department has incurred additional professional fees of £180,000 since December 2008 in advancing three of the five alternative schemes. This sum has been required to commission additional ground surveys, additional detailed ground modelling, and reworking of the original "baseline" scheme. These studies have provided revised costs and a more general validation that proposals forwarded could actually be implemented within the available footprints. Approximately £30,000 of this sum would have been required to be spent at a later stage anyway in providing additional detailed design for the 'Delta' and 'Bravo' taxiways which are common to Options "C" and "E". In addition and wherever possible, detailed design on the remaining 'common' elements of all schemes has continued since the last States debate.

7.5 The total costs of professional fees to date (June 2009) is £1.2m. This sum includes the costs of detailed site surveys (drainage, geotechnical, CCTV and site levels), advice from technical consultants engaged in air traffic systems, pollution control, airfield ground lighting, planning (EIA studies) etc., as well as the costs incurred in the design elements of the project. This sum does not include the costs of site surveys undertaken prior to the engagement of the project team (pre-2007), although the output of these surveys was provided to the team. A further sum of £1.8m in respect of professional fees to cover implementation of the project (essentially from mobilisation to practical completion) has now been included in the overall project budget. This latter provision has been increased by £300,000 since December 2008 to account for additional detailed design requirements.

8. Reports

8.1 A number of reports have been commissioned since the previous States debate, which have assisted in informing the assessment of alternative options. The first, a report by RPS (**Appendix 1**), describes in detail the work undertaken by the Department's consultants since December 2008. The second study by Halcrow Ltd (**Appendix 2**) looks at the acceptability of the options essentially from a safety perspective, whilst the third report produced by York Aviation (**Appendix 3**) focuses on the economic impacts of maintaining or extending the existing runway length.

Report 1: Guernsey Airport Pavement Rehabilitation and Safety Works Supplementary Report by RPS – Appendix 1

8.2 The RPS Supplementary Report provides updates to the original scoping report for the project which informed Billet XVIII, 2008 and the proposed "baseline" scheme put forward at the time. The report also covers the following main areas:

- Consideration of Options (see Section 11: Option Appraisal, in this report)
- Costing of Options "A", "C" and "E"
- Investigation into the possible use of EMAS
- Programme
- Costs
- Contract Procurement
- Environmental Planning Considerations

Report 2: Guernsey Airport Pavements Rehabilitation – Peer Review of Runway Proposals by Halcrow Group Ltd – Appendix 2

8.3 Before selecting its preferred option, the Department needed to determine whether the length (and width) of the runway and RESAs proposed for each option would be acceptable to the regulatory authority (the Civil Aviation Authority[3]). CAP168, which defines aerodrome standards, sets out a recommended RESA requirement to be 240 metres in length at either end of the runway.

8.4 It was considered that an independent consultant should review the options, rather than using existing consultants RPS. This was considered useful as the independent consultant would take on the role of a "third party auditor" to verify the advice received so far on the project and to confirm that the original proposals were establishing a reasonable level of compliance with current aviation standards.

8.5 A brief was prepared for an independent consultant to assess the compliance of Options "A" to "E" and specifically to advise whether a safety case could be made at Guernsey Airport for RESAs of less than 240m at either runway end. Halcrow was appointed to undertake this review in March 2009. Halcrow had

[3] The Civil Aviation Authority issues licences for UK civil aviation airfields to operate. Although Guernsey does not officially fall under its jurisdiction, it is audited against the safety standards set by the CAA in the interests of best practice and is then licensed locally by the DCA. As in the UK, any variants against the safety standards could result in the aerodrome licence being suspended or withdrawn.

previously undertaken work for Guernsey Airport and is well-experienced in aviation-related industry.

8.6 Halcrow considered each of the Options "A" to "E" (plus a number of variants) against aerodrome licensing regulations. It also considered whether costs could be reduced in certain areas without compromising acceptability to the regulatory authority. The following conclusions were reached in the report:

Runway Length

8.7 Regarding a possible extension, whilst a runway extension may not be critical at the current time, nothing should be done to "unnecessarily limit" the possibility of extending the runway in future.

8.8 With regard to any possible shortening of the runway, Halcrow advised that shortening the runway would have an effect on the "usability" of the runway for certain existing aircraft types.

Runway Width

8.9 Halcrow investigated the option of upgrading the runway to a lesser width of 30m to reduce the costs of reconstruction, but concluded that this would pose a safety risk and that the current 45m width afforded an additional margin of protection which should be maintained.

Runway Profile

8.10 The correction of the vertical runway profile constitutes the majority of the cost of the proposed scheme. Halcrow recommended compliance with the required longitudinal gradient standards and therefore would not advise any amendment to the proposal in this regard.

Taxiway Delta

8.11 Taxiway Delta currently has a non-compliant gradient which would be extremely costly and disruptive to level-out. Halcrow has advised that the cost cannot be justified and the risk of serious incident is low. Therefore it concurs that this existing non-compliance should be maintained.

RESAs/Arrestor Beds

8.12 Halcrow carried out a numerical analysis to assess the overrun risk of each of the options. This risk assessment established that only RESAs of 200m or longer would be acceptable to the CAA and thus likely to find favour with the DCA.

8.13 Halcrow commented that the long-standing shortfall in RESA provision in Guernsey and the history of overruns would make the regulator likely to require some improvement to the situation as part of the major works.

8.14 Halcrow's view was that an arrestor system could provide potential savings in land take and in land RESA construction cost. Disadvantages would include the cost of maintaining the system, and the operational disruption and cost of reinstating the arrestor material in the event of an overrun.

8.15 Halcrow suggested that the potential use of arrestor beds is raised with the CAA, as there are questions over the likelihood of acceptance, timeframe and parameters of installation.

Local Impacts

8.16 Halcrow looked at the impact on land and properties in the vicinity of the airport and concluded that none of the options would have a significant visual or noise impact, nor would they significantly increase individuals' exposure to risk.

Assessment of the Options – Summary

8.17 Halcrow focussed on the lengths of the RESAs and runway as they most directly affect operational safety, capital cost and local impact. Halcrow based its study of the RESAs on an analysis of serious overrun risk and the mitigation of this.

8.18 Halcrow's views on each option are given in Section 11 of this report, "Option Appraisal".

8.19 Halcrow advised that Options "C" and "E" offered similar degrees of reduction in serious overrun risk. It considered that in terms of risk these options were essentially the same. "Option E" had already been accepted by the CAA, therefore Halcrow expected that the CAA would accept, or maybe even prefer, "Option C".

8.20 As part of its report, Halcrow included an investigation into whether cost savings could be achieved on the pavements project without compromising acceptable standards. With one minor exception (the profile of grass either side of the runway, or "runway strip profile") it did not find any improvements to the "baseline" design which could be implemented to save money. Its advice in respect of this "runway strip profile" will be reviewed as a matter of course but is not considered to have any material effect on budget or time.

Report 3: Airport Development – Economic Assessment of Options by York Aviation – Appendix 3

8.21 The Policy Council commissioned York Aviation to carry out an economic assessment of options for the development of the runway. A key aspect of this study was to evaluate the social and economic benefits of maintaining the existing runway length (1463 metres), against the possibility of extending the runway to 1700 metres. The study also included an examination of the funding

options for the development of the runway, considered further in Section 14 of this report.

8.22 The report was published in June 2009 and is attached at **Appendix 3**. It first identifies the economic importance of the airport in terms of employment, providing 649 jobs. It also identifies the importance of the airport for the financial, insurance and tourism sectors of the Island's economy.

8.23 It highlights the critical importance of the London Gatwick (LGW) connection, particularly to business travellers, and predicts only marginal growth in air travel to the Island in the short to medium term. After examining current trends in aircraft size, York concluded that the current runway length of 1463m should be sufficient to continue to support existing services in the short to medium term. The loss of the LGW route is identified as a risk which could emerge in future, and for that reason York advises that the refurbishment of the pavements should make provision for the future extension of the runway to 1700m to retain the LGW slot if considered necessary in future. York considered that concerns about the value of slots at LGW and the high costs of operating smaller aircraft into that airport have been overstated as slot availability at LGW is increasing and smaller aircraft are currently being developed and manufactured, particularly to operate into London City airport which has a shorter runway than Guernsey. York concluded that Guernsey is better served by smaller aircraft with higher frequency movements than larger aircraft with reduced frequency and potentially fewer destinations.

8.24 The report concludes that there is minimal risk in the short to medium term associated with remaining with the existing runway length, although it would caution against shortening the length, by using a proportion of the current runway length to extend the RESAs, for example. The risk of a partial loss of service to LGW with the existing length is considered minimal and not imminent.

8.25 Long term changes in the airline market could lead to a requirement to introduce larger aircraft requiring a longer runway. There would be a case for extending at future date if there was a risk of losing direct services to LGW. York advised that it would be prudent to spend a marginally small amount more at this stage to facilitate the later provision of an extended runway at some time in the future, e.g. spending £1m in the short term to "future proof" the airport pavements could save £5m in the long term. York therefore recommends the selection of the option best able to facilitate extension in future by cheapest means, whilst currently maintaining the existing length. It concludes that the extension of the runway at the present time would be a costly exercise which would not benefit the Island economically due to the high cost and limited scope for market growth identified in the report.

8.26 The Public Services Department fully supports the findings of the York Aviation report, which align with the Department's recommended "Option C". This

option maintains the existing runway length whilst facilitating the option to extend at a future date, should the need arise, for example to secure services to LGW. In other words, "Option C" will "future-proof" the runway for extension at no incremental cost.

9. RESA Requirements

9.1 As CAP 168[4] states, RESAs are intended to minimise risks to aircraft and their occupants when an aeroplane overruns or undershoots a runway. The minimum RESA for Code 3 and Code 4[5] runways is 90m, although the CAA recommends RESAs of at least 240m. The length of RESA acceptable to the CAA will depend on a number of variables.

9.2 Fundamental to all the options considered is the RESA requirement. As an alternative to the provision of additional land for RESAs, the use of arrestor beds has been considered. It should be noted that CAP168 (Chapter 3 – paragraph 5.7) requires that any arrestor bed provision is positioned behind the minimum RESA requirement. The ICAO Annex 14 Standard[6] is a 90m RESA with a Recommended Practice of 240m. Modern safety practice applies ICAO's Recommended Practices as Standards wherever practicable. Any difference from that approach would need to be justified on the basis of a safety case that demonstrates how an equivalent safety standard is achieved whilst not meeting the Recommended Practice.

10. Engineered Materials Arrestor Systems (EMAS)

10.1 Arrestor beds were put forward as a recommendation by some deputies during the December 2008 debate. Since that debate, and after the Department had commenced its investigations into the acceptability of other options, the Civil Aviation Authority informally advised that it is considering its policy regarding the use of EMAS (Engineered Materials Arrestor Systems), which is already in use at a number of airfields in the USA. It is not however yet certified for use across the UK and Europe.

10.2 Currently the CAA has advised that arrestor beds may only be installed beyond the minimum RESA length, as an alternative to the reduction of Declared Distances. However, it may be possible that in future the CAA will recognise the use of EMAS within, or in place of, the minimum land RESA length. Although the policy is currently under consideration by the CAA, the outcome is by no means certain. It is estimated that EMAS would need to be 90m at either end of Guernsey's runway to bring to a halt the type of traffic which operates here. EMAS could therefore be accommodated within the existing airport boundary

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4 CAP 168 – Licensing of Aerodromes, Civil Aviation Authority (December 2008): http://www.caa.co.uk/docs/33/CAP168.pdf

5 Guernsey's runway is classified as Code 3

6 International Civil Aviation Organisation document Annex 14, Vol 1 – Aerodrome Design and Operations

and no extension of the boundary would be required, subject to it being approved for use by the regulatory authority.

10.3 EMAS is made up of a number of aerated concrete blocks which crumble under the weight of an aircraft and are designed to bring it to a stop more quickly than a traditional land-based RESA.

10.4 Whilst the benefits of EMAS in an overrun situation have been proven in the US, Halcrow has advised that it is not aware that EMAS has been tested in an undershoot scenario and considers that the benefits of EMAS in this case might be limited.

10.5 There would be a significant risk in Guernsey adopting this technology in the absence of any published guidance from the CAA or ICAO, for example, abortive costly work or delays to the pavements project. The current deteriorating condition of the runway is such that the States does not have the luxury of waiting for this technology to be approved for use in the future. For this reason and due to the high costs of installation, maintenance and repair, the Department recommends that EMAS does not form part of the proposals for the pavements rehabilitation project. Indeed without an agreed policy on EMAS from the CAA or ICAO, the airport would run the serious risk of investing heavily in a system that ultimately does not gain international approval and leaves Guernsey's runway significantly non-compliant in terms of RESA provision.

10.6 The capital cost of "Option A" with EMAS has been estimated to be £9.6m more than the Department's preferred "Option C", and would have an ongoing life-cost as current recommendations would require its renewal every ten years at an approximate cost of £6.5m. **This option would result in an ongoing additional revenue provision of £650,000 per annum to accommodate this routine replacement which sum exceeds the current annual operating surplus of the airport.** None of the other options proposed have the disadvantage of such an ongoing maintenance cost.

10.7 The Department is not recommending EMAS as this option would result in an as yet un-quantified delay to the pavements project on the basis of a potential future policy change by the CAA or ICAO. In addition if the existing runway surface continues to deteriorate it will reach a point where a more extensive reconstruction is required rather than an overlay which is proposed in Options "C" and "E". This would increase the costs and the disruption to the existing airport operation as it would necessitate a longer period of closure.

10.8 Even if the CAA did agree to accept EMAS on UK airfields, there are no accurate timeframes that could be applied and its use could be subject to conditions as yet unknown. The present runway condition is such that a delay would either result in significant abortive costs or render the runway in-operable for certain flights. The Public Services Department does not consider either of these situations to be acceptable.

11. Option Appraisal

11.1 Bringing together all the expert advice detailed previously in this report, an appraisal of the options was carried out and valid options were costed. All costs contain contingencies and a breakdown can be found in the RPS Supplementary Report at **Appendix 1**. A short summary of the considerations for each option is given below:

OPTION A – SIMPLE OVERLAY

Simple overlay of the current runway addressing existing runway non-compliances, apart from the RESAs. Option not costed

Summary of Third Party Views:

RPS: Not acceptable from a regulatory perspective
Halcrow: Not acceptable from a regulatory perspective
York: Does not consider this would be acceptable from a regulatory perspective
DCA: Not acceptable from a regulatory perspective – RESA provision not addressed
Guernsey Airport Consultative Committee (GACC): No specific comments

11.2 This option was examined and discussed with the Director of Civil Aviation and reviewed by Halcrow as part of its compliance report on the project. Both concluded that not to address the existing minimum RESA length was unacceptable. Halcrow makes the following point:

> "We do not believe it would be acceptable to the CAA to carry out the extensive changes proposed to the runway without, at the same time, achieving improvement in the RESA situation… The fact that other options considered here show that RESA improvements are feasible and affordable can only reinforce this view.[7]"

11.3 Going against this advice is not an option as the regulator has the right to withdraw or suspend the licence for the airfield in cases of non-compliance or to apply operating restrictions on the licence holder, such as requiring a reduction in the runway declared distances.

11.4 This option has not been costed due to the fact that it will not be acceptable to the regulator but a plan showing a proposed layout can be found in the RPS Supplementary Report (**Appendix 1**).

11.5 The Department is advised that it is highly unlikely that a proposal to provide an interim temporary overlay would be approved by the regulator. However, in the

[7] Halcrow Peer Review of Runway Proposals, p.29

unlikely event that it was approved, it would incur abortive costs running into several millions of pounds. Such costs would have to include replacement of the current runway centreline lights as the existing units cannot be lifted to accommodate an overlay. Both temporary repairs on the runway or permanent reconstruction on other airport pavements would be considered as substantive works on the airfield and necessitate a revision of the existing RESA lengths, so it is simply not an option to address the runway or pavement surfaces without addressing the RESAs.

OPTION A2 – SIMPLE OVERLAY WITH EMAS

A simple overlay with EMAS installations at each end thereby addressing RESA provision. Option costed at £90.5m

Summary of Third Party Views:

RPS: Would not recommend due to increased cost
Halcrow: Suggests asking regulator's view
York: No specific comments
DCA: This option is not acceptable until there is a policy statement from the CAA supporting the use of EMAS
GAAC: Significant reservations over the use of EMAS

11.6 This option became a possibility relatively recently due to potential developments in the use of EMAS technology in the UK.

11.7 Due to the current regulatory uncertainty of the approval of EMAS, the excessive additional costs associated with its installation and maintenance (detailed above in paragraph 10.6) and the requirement to undertake substantive works in the short term, this option has not been recommended.

11.8 Option A with EMAS cannot take into account the 1:20 gradient so would require more fill material than other options resulting in more vehicle movements to and from the site.

OPTION B – LONGER WEST RESA

Provide a full 240m RESA at the west end, with only the existing 90m RESA at the east; without offsetting the runway threshold further west. Option not costed

Summary of Third Party Views:

RPS: Not acceptable from a regulatory perspective
Halcrow: Not acceptable from a regulatory perspective
York: No specific comments
DCA: As proposed a 90m RESA provision at the eastern end is not acceptable (any adapted option that involved EMAS at the eastern end would need to be considered on the same basis as "Option A2")
GAAC: No specific comments

11.9 This option was derived from discussions that suggested the opportunity be taken to only improve the eastern RESA if and when a 1700m runway extension was provided. The regulator's view was sought on this option and once again this option was reviewed by Halcrow. Both concluded that whilst it was appropriate to provide a full 240m RESA at the western end, any proposal that did not improve the minimum RESA provision at the eastern end would not be acceptable. The practical implications of providing a full 240m RESA at the western end would not be significantly different in terms of groundworks from the original baseline proposals ("Option E") with a significant compromise in not addressing the eastern RESA.

11.10 Halcrow's view is that this option is not acceptable as both ends of the runway should be afforded a similar level of serious overrun risk. This option was not costed for this reason.

OPTION C – FUTURE PROOF OPTION

An option providing a 240m RESA at the western end (albeit slightly clipped) with a 198m RESA at the east.

Option costed at £80.9m

Summary of Third Party Views:

RPS: Support this option as the most cost-effective long-term solution
Halcrow: Expect this option to be acceptable from a regulatory perspective
York: Support as it provides for a runway extension in future if necessary
DCA: Based on the safety assessment provided by Halcrow in its report and the previous positive response from the CAA to the 202m RESA "baseline option", this option would be acceptable
GAAC: Support this option as it is likely to find favour with the regulator

11.11 The regulator has indicated that this option would be acceptable and is considered worthy of investigation. Some cost savings would materialise in not providing a starter extension, although there would be some further encroachment to the west with this proposal, when compared to the original baseline scheme (now "Option E").

11.12 This option necessitates the displacement of the runway threshold to the west, leaving a starter extension at the eastern end of the original runway of approximately 124m.

11.13 Critically, this option provides the most "future-proof" scenario and the opportunity to move to a 1700m extension of the runway at some point in the future without having to revisit the RESA or the runway configuration at the western end of the airfield. This is on the basis that the States decided on this course of action in the future. This option has been considered by Halcrow in its

compliance review and is identified as being a valid option. This view has been endorsed by York Aviation.

11.14 Halcrow[8] summarises the importance of "future-proofing" the runway as follows:

> "It is a basic principle of good planning, however, that nothing should be done to critical infrastructure that would eliminate or unnecessarily limit future development choices. We therefore believe that the option to extend the runway in the future should be preserved, provided that this does not detract from the effectiveness of the immediate solution and that the cost of doing so is acceptable."

11.15 Halcrow considers that this option greatly reduces the level of serious overrun risk, and is therefore likely to be acceptable to the CAA.

11.16 This option was costed at £80.9m and provides millions of pounds in "future-proofing" savings. If the western RESA is provided at 240m as proposed under "Option C", then no further work would be required to the western end in the event that a runway extension to 1700m was approved by the States of Deliberation. All of the additional work would be carried out to the east.

11.17 Halcrow also looked at "Option C2", extended east, with both RESAs at 240m and a runway extension to 1700m. This option is not recommended because it would involve extending the airport boundary to the east and providing a costly extension (at least £23m) which is not considered necessary at this time and has not been provided for in the States' capital prioritisation process. York Aviation also endorsed the view that it was not necessary to extend the runway at the present time.

11.18 As a result of the removal of a starter extension at the western end of the runway (as proposed in the original "baseline" scheme) together with further research undertaken in the detailed design phase, the amount of material needed to build up the ground ("fill material") required for the western end on both Options "C" or "E" has now been greatly reduced. The "baseline" scheme required approximately 382,000 tonnes of imported fill material. Under Options "C" and "E", this is reduced to negligible quantities which can be gathered from site arisings therefore requiring no import of fill material and dramatically reducing the number of vehicle movements to site during the construction phase for other materials.

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[8] Halcrow Report, p.7

OPTION D – REDUCE LANDING DISTANCE

Provide increased RESAs (approx 135m) within the existing airport boundary, by a corresponding reduction in the runway landing distance. Option not costed

Summary of Third Party Views:

RPS: Does not support this option as it is not acceptable to the regulator or the airlines
Halcrow: Option not acceptable from a regulatory perspective
York: Does not support a reduction in runway landing distance available
DCA: This option does not satisfactorily address the RESA issue and is not acceptable
GAAC: Do not support as this option would restrict operations of certain aircraft

11.19 This option increases the RESA length, without extending the existing airport boundary, but would reduce the Landing Distance Available (LDA) from 1465m to 1385m. Aurigny does not consider this would unduly impact its operations; however Flybe has indicated a penalty on its Dash8-Q400 operations under certain weather conditions due to the reduced LDA. This option would have an even greater impact on any future Embraer 195 operations, to the extent that even in dry conditions Flybe would not be effectively able to operate the Embraer 195 into Guernsey if the LDA was reduced from the current length.

11.20 For these reasons, this option is not considered viable. The regulator has also confirmed that provision of only a 135m RESA, albeit partly paved, would not be acceptable when a larger RESA provision is technically viable.

11.21 Halcrow states that this option would reduce the level of serious overrun risk in both directions and minimise local impacts and cost but possibly would not be sufficient to find favour with the CAA.

11.22 This option was not costed for the reasons given above.

OPTION E – BASELINE SCHEME

"Baseline" scheme but with removal of the western starter extension.
Option costed at £81.1m

Summary of Third Party Views:

RPS: More disruption and cost in relation to "Option C" if the runway is extended in future
Halcrow: Acceptable from a regulatory perspective
York: No support as does not "future-proof" the runway for a future extension
DCA: Acceptable in terms of RESA provision - 202m at each end as previously proposed under the "baseline" option
GAAC: Support this option as it is likely to find favour with the regulator

11.23 Fundamentally this option has been retained, with the removal of the originally proposed western starter extension. The most immediate impact is to lessen the infill material required to provide the western end RESA, as the maximum permissible gradient on the RESA can be exploited from the end of the runway strip, as opposed to the end of the starter extension. The extent to which the RESA encroaches into the western fields is less with this option than with "Option C".

11.24 In its review of "Option E", Halcrow states that it reduces the impact and extent of works required at the west end. It greatly reduces the level of serious overrun risk and should be acceptable to the CAA.

11.25 One of the key points made in the York Aviation report was that, in choosing a scheme to rehabilitate and improve the runway, the States should provide for the possibility that the runway may be required to be extended in future. In this regard "Option E" does not provide the degree of "future-proofing" offered by "Option C".

11.26 "Option E" is marginally more expensive than "Option C" because it requires the runway threshold to be moved 5m further west (to accommodate a 202m RESA at the eastern end). This 5 metres of additional runway surface required is more expensive than having an extra 38 metres of grass RESA with "Option C".

12. Preferred Option

12.1 Taking all of the above into consideration, the Department has selected "Option C" as its preferred option, due to its acceptability to the regulator and its ability to be upgraded in the future should an extension be deemed necessary. It is also the lowest priced compliant option.

12.2 Options "B" and "D" were eliminated due to their unacceptability to the regulator. "Option A" with the use of EMAS may become acceptable from a regulatory perspective at some point in the medium term future, however given the increased cost, the operational disadvantages and the potential delay before any substantive runway works can be commenced, this option cannot be recommended to the States.

13. Planning Considerations

13.1 As a result of the introduction of the new Planning Law in Guernsey and given the concerns raised at the December 2008 debate, the Public Services Department has commissioned consultants RPS to undertake an Environmental Impact Assessment (EIA) for the proposals which are being placed before the States for ratification. The EIA has been based on "Option C" and a number of separate studies have been commissioned to provide essential data to assess the preferred option. These are:

- Archaeology & Historic Environment
- Air Quality & Climate
- Ecology, Natural Resources & Landscape Character
- Lighting
- Noise
- Socio-Economic & Health Impact
- Hydrology and Flood Risk
- Development Contingencies
- Transport

13.2 With regard to the question of whether a Planning Inquiry is needed, RPS has provided the following summary[9]:

> "It is considered that the proposals are fully compliant with the primary objectives and aims of the RAP [Rural Area Plan] and as such, the established development policy for the Island. Accordingly, a formal amendment to the RAP is not necessary, which in turn negates the need for a Public Inquiry."

13.3 The Public Services Department has submitted detailed plans and illustrations to the Environment Department and is awaiting its views on planning issues. The Environment Department's initial comments on whether a Planning Inquiry is required have been received in a letter dated 13 August 2009 (**Appendix 5**) and similar advice will be sought from HM Procureur and fed back when received. The Public Services Department welcomes and concurs with the Environment Department's initial view that a Planning Inquiry will not be required.

13.4 As Options "C" and "E" require the displacement of the existing runway threshold further west, and given concerns expressed on a potential change in noise levels at a limited number of individual properties, the Department is undertaking some additional research and consultation.

13.5 Firstly noise monitoring will be undertaken at key sites over the next few months to quantify any potential change in the noise profile of aircraft on a westerly approach, if the runway threshold is moved further west. It should be noted that aircraft taking off to the west would begin their run at the same point, and would not impact on noise profiles at the western end.

13.6 Discussions are also taking place with the airlines over a potential modification to the standard angle of approach (the glide-path) from the west, which is

[9] RPS Supplementary Report, section 13.8.2

currently set at 3 degrees. Any modification to this current 'standard' operational parameter would require separate regulatory approval and would need to be balanced against any environmental benefits that could arise.

14. Funding Options

Fiscal and Economic Policy Group

14.1 In late December, and following consultation with the Treasury and Resources, Commerce and Employment and Public Services Departments, the Fiscal and Economic Policy Group gave consideration to various funding options for the airport ranging from a complete "gift" from the States for the project, to full funding from an increase in passenger charges. As a result of this, the brief for York Aviation was extended to give consideration to the funding issues and it was also asked to ascertain, as part of its study, the likely impact of increases in charges on overall passenger numbers.

York Aviation

14.2 York Aviation considered options for funding the development of the runway as part of its economic assessment. It concluded that anything more than a nominal increase in passenger charges would result in a reduction in demand and therefore reduce the range of air services available. It took the view that a reduction in the range and frequency of services would damage the Island's economy and impact on tourism and attractiveness as a business location.

14.3 York considered that a charge of £1.95 per passenger movement might be manageable albeit at risk of damage to the market and indicated that this could lead to a 7% reduction in passenger numbers. It considered that anything higher would damage Guernsey's economy. Stakeholders consulted during the research process identified a perception of already high air fares.

14.4 York considers that some level of funding from the States is justified in recognition of the wider benefits to society and economy which the operation of the refurbished existing runway and any future extension would bring.

Impact of Capital Prioritisation Debate

14.5 As a result of the capital prioritisation debate on 26th June 2009, the States has agreed that the airport pavements development shall be funded from transfers from the capital reserve with proposals to increase contributions from the Ports Holding Account. The Public Services Department has significant reservations over the scale of the increases in passenger charges proposed, particularly if levied entirely from air passengers. In light of the advice received by York Aviation there could be serious implications on passenger volumes if charges to the airlines were to increase substantially. Further advice on the quantum and timing of any increases in charges is being sought from the Treasury and Resources and Commerce and Employment Departments.

15. Identification of Potential Contractors

15.1 In early September 2008, the Public Services Department placed advertisements in five civil contractor trade publications inviting contractors to apply for a 'Request for Information' document. As a result, seventeen companies requested documentation and seven of those companies subsequently returned submissions before the closing date (26th September 2008).

15.2 In advance of placing advertisements, the Pavements Project Team had established criteria in association with the Department's consultants (RPS), to evaluate the various submissions. These criteria were set out to establish each respondent's technical ability, financial standing, previous relevant experience on airports and the relevant qualifications and experience of its project team.

15.3 Following evaluation of the responses received, five companies were shortlisted and will be invited to tender, once the States has approved a scheme. The five companies shortlisted are (in alphabetical order):

Costain Limited
Edmund Nuttall Limited
Fitzpatrick Contractors Limited
Lagan Construction Limited
Trant Construction Limited

Supporting Inward Investment

15.4 It is to be noted that no locally based contractor was shortlisted. This is understandable given the basic requirement for proven experience in operating in an aviation environment and evidence of undertaking highly technical and specialist projects, entailing complex logistics of carrying out the works whilst keeping the airport fully operational. Approximately 25% of the cost of the project (circa £20 million) can be attributed to the nature of undertaking the critical works within operational requirements and infrastructural elements (including the access to the runway) being limited to the night hours and the runway, taxiways, ground lighting, instruments, radar etc., all having to be back in operational use before 6am each day). In this context, an inexperienced contractor could add significantly to the risks inherent in any project and create major financial implications and delay to the project as well as cause significant additional disruption to travel of the general public. This is not a risk the Island can afford to take.

15.5 The Department is however acutely aware that in the current economic environment every jurisdiction needs to work hard to encourage the maximum use of local labour and resources in projects such as this.

15.6 Therefore, while it would not be appropriate for any contractor to be told who to employ, it is proposed that when negotiating the final package with the preferred

contractor(s) the Public Services Department will ensure there is a clear understanding that the States is looking for a direct and quantifiable benefit or contribution to the local economy that will be achieved through the way the contractor proposes to operate the contract. This will create an incentive for contractors to source material and labour locally but without specifically stipulating who it engages as a sub-contractor or supplier.

16. Guernsey Airport Consultative Committee

16.1 The Guernsey Airport Consultative Committee (formerly the User Committee), which includes representatives of all airport users has considered the five runway options as detailed in this report. The Consultative Committee would be fully satisfied with either "Option C" or "Option E" as these are proposals which would be approved by the regulator.

16.2 The Committee did however express significant reservations over the use of EMAS, particularly in respect of potential time delays in recovering an aircraft from the material and more probably delays (and corresponding disruption) arising from the time taken to then replace the damaged EMAS blocks, which work would necessitate several periods of night work, with disruption as a result of reduced runway operational distances during the daytime, until all the EMAS blocks that had been damaged were replaced from the spare EMAS stock holding.

16.3 The Airport Consultative Committee's views on the overall scheme were previously reported in the Public Services Department's earlier States Report on the matter, Billet D'Etat XVIII, December 2008 – para 18.2.

17. Conclusions

17.1 The Public Services Department is of the view that its proposals, as presented in Billet XVIII of December 2008, remain the optimum and appropriate solution for Guernsey Airport, with some minor modification to the western end configuration of the runway in accordance with the "Option C" proposals detailed at paragraphs 11.12-11.19. Nonetheless, this current report is prepared in such a way that if sufficient States Members consider that one of the other options as outlined and investigated would be more appropriate, then they can amend the proposals in that respect. It should, however, be understood that the works at the airport represent a package and that the various elements must fit together if it is to work. Further, the safety regulators require that the whole package of proposals needs to be formally approved as a package and it will test to ensure that the eventual scheme protects the safety of those on the aircraft and those on the ground. The approval process will only accept compromises where the regulator has been convinced that a sufficiently strong safety case has been made.

17.2 There are significant implications of any further delay on this project. **Appendix 1** of this report provides quantification and updates on the current condition of

the various pavement surfaces and airfield ground lighting which is clearly time-expired. Further work will be carried out this autumn to arrest the worst of the surface degradation of the runway, including revisiting of repairs carried out during the autumn of 2008. Much of the work already undertaken and yet to be carried out this autumn is abortive and cannot arrest a more general degradation which has occurred over time.

17.3 It is essential that the States of Deliberation approves a scheme of works without further delay, in order to maintain the current basic infrastructure at the airport, which few could argue is anything other than a strategic economic enabler for the local economy.

17.4 The Public Services Department is acutely aware that the proposals are for a project with a significant cost and it has therefore worked very hard to ensure that it provides what is necessary for the airport rather than what is desirable. In preparing the previous report (Billet XVIII, December 2008), it had assessed that to do everything which a modern lifeline airport such as Guernsey could have, would cost in the region of £160 million. This would include not only a 237m extension to the runway to make it 1700m but also making the taxiways fully compliant in terms of their levels (creating a fully compliant taxiway at Delta), 240m RESAs at each end, moving the control tower block to the north to create additional aircraft parking, and various other improvements that would achieve current safety requirements in every respect or otherwise provide maximum opportunities on the airfield.

17.5 The Department has taken the view that the Island simply cannot afford all of the above mentioned improvements at this time and has therefore put "Option C", and its baseline scheme "Option E", forward as realistic minimum alternatives.

Recommendations

The Public Services Department recommends the States:

1. To approve the upgrade to the Guernsey Airport runway to meet safety requirements as outlined above in this report in configuration with the "Option C" proposal, including the provision of RESAs of 240m (west) and 198m (east).

2. To approve other renovation and rehabilitation works to the Guernsey Airport pavements and associated areas, in addition to the runway works, as detailed in paragraph 1.7 and summarised as follows:

    - Resurfacing of the aprons
    - Resurfacing and realignment of the taxiways
    - Replacement of the airfield ground lighting system and relocation of navigational aids

- Improvements to foul and surface water drainage
- Minor miscellaneous items, e.g. foundations for security huts, security fencing, etc.
- Contingency sums, fees etc.

3. To approve the following list of contractors to be invited to tender:

Costain Limited
Edmund Nuttall Limited
Fitzpatrick Contractors Limited
Lagan Construction Limited
Trant Construction Limited

4. To authorise the Treasury and Resources Department to approve a capital vote for the runway and associated pavement rehabilitation works at a cost not exceeding £80.9m.

5. To authorise the Treasury and Resources Department to approve the appointment of the Public Services Department's recommended contractor and to approve other professional services in connection with these works.

Yours faithfully

B M Flouquet
Minister

Appendices

Appendix 1 RPS – Guernsey Airport Pavement Rehabilitation and Safety Works – Supplementary Report, July 2009

Appendix 2 Halcrow Group Limited – Guernsey Airport Pavements Rehabilitation – Peer Review of Runway Proposals, June 2009

Appendix 3 York Aviation – Airport Development – Economic Assessment of Options, June 2009

Appendix 4 Project Scope – Section 3.10, Billet d'Etat XVIII, 2008

Appendix 5 Letter from Environment Department dated 13 August 2009 Concerning Planning Issues

Appendix 1

Guernsey Airport
Pavement Rehabilitation and Safety Works
Supplementary Report

Prepared for

Guernsey Airport

Document Details

Project Ref	15482	
Revision	A	
Written by		Jonathan Green
Reviewed by		Geoff Dewick
Date	22 July 2009	

Contents

1.0 Executive Summary

1.1 This report Supplements the RPS Report on "Airfield Pavements Rehabilitation/Improvements Scoping Report", dated 5 December 2007.

1.2 Three alternative Runway Options are now proposed.

1.2.1 Runway Option A with EMAS could be developed within the existing Airport boundaries and would involve a 24m runway towards the west. This option minimises environmental impact to the west of the airport, but there are concerns over the Regulatory approval of the use of the Engineered Material Arrestor System (EMAS) within the timeframe of the Guernsey project. This is the most expensive option at £90.5m and has ongoing maintenance; requiring the EMAS to be replaced at approximately 10-year intervals at a current cost of approximately £6.5m.

1.2.2 Runway Option C requires land acquisition to the west, closes La Mare road and involves a 120m runway displacement to the west. The length of the western Runway End Safety Area (RESA) is fully compliant with the current CAA recommendations at 240m, but the RESA is clipped at the south west corner. This is the cheapest proposal option at £80.9m. It is also the most appropriate for extension to 1700m, if this were required in the future.

1.2.3 Runway Option E also requires land acquisition to the west, closes the La Mare road and involves a 125m runway displacement to the west. 202m long RESA are proposed at both ends. This is an adaption of the "baseline" scheme presented to the States in December 2008, but without a western Starter Extension which was regarded as beneficial, but not essential. The cost of this option is the same as Option C, but would be more disruptive to extend to 1700m if required in the future.

1.3 Due to the omission of the western starter extension and a proposal to undertake a weekend closure to reconstruct the western end of the existing runway, there is only a nominal requirement to import fill material for all of the three Options.

1.4 BBA, a runway surfacing product developed in France is being considered as an alternative to grooved Marshall Asphalt or porous friction course. This may not need to be grooved and would therefore be simpler and quicker to lay and will provide a longer service life.

1.5 The existing runway condition is deteriorating resulting in additional annual maintenance expenditure. If the rehabilitation is delayed, there is a risk that the deterioration will require localised reconstruction prior to overlay. This could add significant costs to the currently proposed rehabilitation scheme.

1.6 The airfield ground lighting (agl) is nearing the end of its serviceable life and the cabling is in poor condition.

1.7 For either Runway Options C or E, a new Taxiway Bravo is proposed as the existing taxiway will be closed due to the displacement of the Instrument Landing System. The replacement taxiway will be built to a lower specification suitable for only smaller aircraft. The cost of this is included in the budget estimates.

1.8 For Options C and E, it is also proposed to extend the Delta taxiway to the displaced western runway end. This is considered essential to maintain the current airport efficiency; without this taxiway delays will occur more regularly.

1.9 Apron layouts are being further explored. The airlines have agreed in principal to pay for the installation of fixed ground power to service aircraft stands. This will be environmentally beneficial to the airport, but results in less flexibility in the future stand layout.

1.10 Surveys have identified that the existing drainage pipe network is in poor condition and will require replacement rather than “lining” which had previously been proposed.

1.11 Once the States has identified which Runway Option is to be developed, the scheme will require more detailed design and a Full Planning Application will then be made.

1.12 An Environmental Impact Assessment (EIA) will be required and will be submitted with the Planning Application. This will take account of any long-term impacts as well as any impacts associated with the construction period.

2.0 Introduction

2.1 Background

2.1.1 This report is a supplement to the RPS Report on "Airfield Pavements Rehabilitation/Improvements Scoping Report", dated 5 December 2007.

2.1.2 The December 2007 Report outlined the options and decisions that had been made by the Project Board during the development of the scoping study. The report formed the basis of a Billet d'Etat XVIII that was circulated to members in advance of the States meeting on 10 December 2008. It had been intended that the billet would be noted such that after the States debate on the capital prioritisation (then programmed for March 2009), the States would then be in a position to approve the content of the 'baseline' scheme.

2.1.3 Following the finalisation of the December 2007 Scoping Report, the budget costs were revised in June 2008 to take account of more detailed level information becoming available for the runway and the incorporation of a western extension to the Delta Taxiway and omission of the proposed western turn-pad. As a result, the scheme cost increased from £51.1m to £57.8m (excluding contingencies). The later figure was reflected in the billet, with contingencies added, at £84.5m.

2.1.4 In advance of the 10 December 2008 States meeting, two sursis were served and after significant debate in the meeting, the first of these sursis submitted by Deputy Kuttelwascher was upheld.

2.1.5 Public Services Division (PSD) identified a number of concerns from the sursis debate that required further consideration before the proposals for the airport were again submitted to the States for debate:

- Further options for the runway end safety areas should be explored and presented for debate,
- Whilst presented as a 'baseline' scheme, there was concern from some Members that the described proposals did not represent the 'do-minimum' solution,
- There was concern that inadequate consideration had been given to Engineered Material Arrestor Systems (EMAS) that have been used in the United States of America,
- There was concern that the debate should only take place after the debate on capital prioritisation,
- It was felt that the next version of the billet should incorporate the findings of a report commissioned by Commerce and Employment regarding the commercial benefits of an extended runway.
- It was recognised that the CAA requirements and recommendations are subject to interpretation in some aspects. Public Services confirmed their

intent to appoint a third party audit of the proposals to confirm that the proposals are not excessive nor fall short of reasonable safety standards. The next version of the billet should incorporate any comments from this audit process.

2.1.6 In order to address the first of the above matters, Public Services wrote to all Deputies asking for them to submit outline proposals of any options that they considered needed review. The 12 responses were reviewed and resulted in 5 new options to be considered alongside the original 'baseline scheme'.

2.1.7 The delay in the detailed design of the scheme resulting from the sursis has also provided additional time for research to be undertaken into new products and product development that would potentially be beneficial to Guernsey Airport. The key items investigated include:

- Frangible Instrument Landing System (ILS) support structures,
- Low temperature asphalts,
- BBA surfacing materials.

2.1.8 All options include the works to the aprons and taxiways that were outlined in the 'baseline' scheme, but adapted appropriately to suit the particular runway option:

Option A: This option involves the simple overlay of the existing 1463m runway and does not increase the Runway End Safety Areas (RESA's) at either end of the runway.

Option A – with EMAS: Retaining a 1463m runway within the existing airport boundary and incorporating Engineered Materials Arrestor Systems (EMAS) within the RESAs. The runway is displaced to the west by approximately 24m. This option includes the re-profiling of the runway and runway strip.

Option B: This option retains the existing runway, in its current configuration, but provides a new 240m grass RESA at the west end of the runway. It involves the closure of the La Mare road to the west and incorporates the construction of an embankment to comply with the requisite RESA profiles. The embankments should be constructed using appropriate material such that it could accommodate a later runway extension to achieve 1700m. The existing 90m RESA at the east end is retained.

Option C: With this option, the runway will be displaced to the west such that the western runway end is in a suitable position to accommodate a future extension to the east for a 1700m runway with 240m RESA's at both ends. The 1463m option will incorporate a Starter Extension at the east end (on the existing displaced runway), but no Starter Extension to the west. The RESA at the west end will be 240m and the RESA at the east will be approximately 198m, or whatever can be accommodated within the existing east boundary of the airport.

Option D: Involves the shortening of the Landing Distance Available on the current runway, whilst retaining the current Take-Off Distance Available. Extended RESAs are to be incorporated, but only to the extent that can be accommodated within the current airport boundaries. This is an adaptation of the option put forward. An original illustration provided with the option could not be physically accommodated due to the high embankment requirements at each end of the runway as a result of the extended length of the paved runway.

Option E: This is the option that was previously submitted as the 'baseline' scheme, with 202m RESAs and an eastern Starter Extension but omitting the western starter extension, that was proposed in the original 'baseline' scheme.

2.1.9 The 'baseline' scheme together with the five Options and two sub-options are illustrated:

Baseline
Option A
Option A with EMAS
Option B
Option C 1463m
Option C 1700m
Option D
Option E

Runway Layout - Baseline (1463m)

1463m LDA, 202m Western & Eastern RESAs

Key

- Existing Airport boundary
- Runway 09-27
- Runway starter extension
- 105m Runway clear & graded strip
- 150m Runway strip
- Blast Pad
- RESA area - Grassed
- ILS base
- Land required
- Earthworks
- Proposed new taxiway

notes :

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A DIVISION OF THE PUBLIC SERVICES DEPARTMENT

Project: Airfield Pavements Rehabilitation

Title: Runway 09 - 27 Baseline - 1463m LDA General Arrangement

Drawing Status	Date Created	Drawing Scale
Preliminary	25/06/09	n.t.s.
Project Leader	Drawn By	Initial Review
GDD	SD	YP

Drawing Number: 15482 / A4 / SK1104 Rev: -

Runway Layout - Option A

1463m LDA, existing Western & Eastern RESAs

Key

- Existing Airport boundary
- Runway - To be resurfaced
- 105m Runway clear & graded strip
- 150m Runway strip
- Blast Pad
- RESA area - Grassed
- ILS base
- Earthworks
- Proposed new taxiway

notes :

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Project: Airfield Pavements Rehabilitation

Title: Existing Runway 09 - 27 Option A General Arrangement

Drawing Status	Date Created	Drawing Scale
Preliminary	16/06/09	n.t.s.
Project Leader	Drawn By	Initial Review
GDD	SD	YP

Drawing Number: 15482A / A4 / SKA1104 Rev: -

Runway Layout - Option A with EMAS

1463m LDA, existing Western & Eastern RESAs

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Key

- Existing Airport boundary
- Runway - To be resurfaced
- 105m Runway clear & graded strip
- 150m Runway strip
- ILS basc
- Land required
- Blast Pad & Stopway
- RESA area - Grassed
- RESA area - EMAS
- Earthworks
- Additional taxiway pavement

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ADVISION OF THE PUBLIC SERVICES DEPARTMENT

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Title: Runway 09 - 27
Option A with EMAS
General Arrangement

Drawing Status	Date Created	Drawing Scale
Preliminary	16/06/09	n.t.s.
Project Leader	Drawn By	Initial Review
GDD	SC	YP

Drawing Number: 15482A / A4 / SKA1105 -
Rev:

Runway Layout - Option B

1463m LDA, existing Eastern RESA and 240m Western RESA

Key

- Existing Airport boundary
- Runway - To be resurfaced
- 105m Runway clear & graded strip
- 150m Runway strip
- ILS base
- Blast Pad
- RESA area - Grassed
- Earthworks
- Land required
- Proposed new taxiway

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Project: Airfield Pavements Rehabilitation

Title: Existing Runway 09 - 27 Option B1 General Arrangement

Drawing Status	Date Created	Drawing Scale
Preliminary	17/06/09	n.t.s.
Project Leader	Drawn By	Initial Review
GDD	SD	YP

Drawing Number: 15482B / A4 / SKB1104 - Rev: -

Runway Layout - Option C (1463m)

1463m LDA, 240m Western & 197m Eastern RESAs

Key

- Existing Airport boundary
- Runway 09-27
- Runway starter extension
- 105m Runway clear & graded strip
- 150m Runway strip
- Earthworks
- Blast Pad
- RESA area - Grassed
- Decommissioned taxiways
- Proposed new taxiways
- ILS base
- Land required

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Project: Airfield Pavements Rehabilitation

Title: Runway 09 - 27 Option C5 - 1463m LDA General Arrangement

Drawing Status	Date Created	Drawing Scale
Preliminary	16/06/09	n.t.s.
Project Leader	Drawn By	Initial Review
GDD	SD	YP

Drawing Number: 15482C / A4 / SKC1104 -
Rev: -

Runway Layout - Option C (1700m)

1700m Runway, 240m Western & Eastern RESAs

Key

- Existing Airport boundary
- Runway 09-27
- Runway starter extension
- 105m Runway clear & graded strip
- 150m Runway strip
- Blast Pad
- RESA area - Grassed
- ILS base
- Decommissioned taxiways
- Proposed new taxiways / turnpad
- Land required
- Earthworks

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Project: Airfield Pavements Rehabilitation

Title: Runway 09 - 27
Option C5 - 1700m
General Arrangement

Drawing Status	Date Created	Drawing Scale
Preliminary	19/06/09	n.t.s.
Project Leader	Drawn By	Initial Review
GDD	SD	YP

Drawing Number: 15482C / A4 / SKC1105 -
Rev: -

Runway Layout - Option D (1385m)

1385m LDA, 135m Western & Eastern RESAs

Key

- Existing Airport boundary
- Runway 09-27
- Runway starter extension
- 105m Runway clear & graded strip
- 150m Runway strip
- Blast Pad
- RESA area - Grassed
- ILS base
- Decommissioned taxiways
- Proposed new taxiways
- Earthworks

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Project: Airfield Pavements Rehabilitation

Title: Runway 09 - 27
Option D(i) - 1385m LDA
General Arrangement

Drawing Status	Date Created	Drawing Scale
Preliminary	19/06/09	n.t.s.
Project Leader	Drawn By	Initial Review
GDD	SD	YP

Drawing Number: 15482D / A4 / SKD1104 - Rev

Runway Layout - Option E (1463m)

1463m LDA, 202m Western & Eastern RESAs

Key

- Existing Airport boundary
- Runway 09-27
- Runway starter extension
- 105m Runway clear & graded strip
- 150m Runway strip
- Blast Pad
- RESA area - Grassed
- ILS base
- Decommissioned taxiways
- Proposed new taxiways
- Earthworks
- Land required

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Project: Airfield Pavements Rehabilitation

Title: Runway 09 - 27
Option E5 - 1463m LDA
General Arrangement

Drawing Status	Date Created	Drawing Scale
Preliminary	19/06/09	n.t.s.
Project Leader	Drawn by	Initial Review
GDD	SD	YP

Drawing Number: 15482E / A4 / SKE1104 -
Rev:

2.1.10 Only the following options have been fully considered and costed in this report:

Option A – With EMAS,
Option C,
Option E

2.1.11 The remaining options have been disregarded as follow:

Option A: has been disregarded as it does not provide an improvement to the RESA, which is unacceptable to the Director of Civil Aviation (DCA).

Both these issues were considered by the third party auditors, Halcrow who confirmed *"We do not believe it would be acceptable to the CAA to carry out the extensive changes proposed to the runway without, at the same time, achieving improvement in the RESA situation".*

Option B: has been disregarded as it does not provide an improvement to the RESA at the east end, which is unacceptable to the DCA.

Halcrow state *"…all operations must be afforded a tolerable level of overrun risk so, on the same arguments as applied to Option A, it would not be acceptable to leave the Runway 09 RESA at an unimproved 90m"*.

Option D: has been disregarded as whilst it improves the RESA at both ends to 135m; this is not considered sufficient and is unacceptable to the DCA.

In addition this option does not provide adequate Landing Distance for Flybe operations using the Embraer 195. Flybe General Manager for the Embraer 195 stated *".....the primary limitation for the E195 in GCI is the LDA. In dry conditions it is not too restrictive however, in the wet, we are limited quite severely. Further reductions in LDA [from the current] would impact us to a large degree even in dry conditions, indeed I would suggest that the 195 could not operate into GCI were that to be the case."*

Option D would reduce the LDA to 1385m from 1463m.

2.2 Appointment

2.2.1 RPS provided a fee proposal, dated 29 January 2009 for developing these options. The Airport Director confirmed approval of fees for developing Options C and E in an email dated 20 March 2009. The fees for developing Option A with EMAS were approved at a PSD Board meeting on 4 June 2009.

2.3 Scope

2.3.1 The proposed scope of the works provided in the RPS 5 December Report has been extended to include:

- The use of EMAS in substitution for full length grass RESA,

- Additional costs for Cat III runway lighting for each option under consideration,

- Feasibility study into the provision of Fixed Ground Power at the head of stands,

- Details for dealing with pollution control resulting from the use of fire-fighting foams that has been identified at sites within the airport boundary,

- Planning Consultancy and Management of an Environmental Impact Assessment for the works.

2.4 Licensing Considerations

2.4.1 Since the RPS 5 December Report, the responsibility for the issuing of the licence for operation of the airport has been transferred from the Royal Court to the Director of Civil Aviation.

3.0 Design Aircraft

3.1 Current Requirements

3.1.1 Since the 5 December 2007 RPS Report, Flybe have confirmed that they would be able to operate the Embraer 195 from the current 1463m runway on a commercial basis albeit with a reduced fuel and/or passenger payload. They have stated that it would be their intention to operate these aircraft on the Gatwick route as soon as the runway has been strengthened to accommodate them.

3.2 Potential Future Requirements

3.2.1 The findings of the York Aviation Report, which was commissioned by the Policy Council, are that the 1700m runway cannot be justified at the current time, but that if possible, land should be safeguarded for this extension to be accommodated in the future.

3.2.2 It is understood that the current States capital prioritisation budget has made no allowance for the runway extension to 1700m and that this would therefore be the subject of further debate post April 2012.

3.3 Pavements - Design Aircraft

3.3.1 There is no proposal to change the design requirements from those previously identified:

3.3.2 Runway pavement to provide Pavement Classification Number (PCN) 36
Taxiway pavements to provide PCN 36
Apron pavements to be constructed in concrete to provide PCN 50

4.0 Runway

4.1 Runway End Safety Areas

4.1.1 The Runway End Safety Areas (RESAs) are a fundamental consideration of the options that are under consideration.

4.1.2 The current RESAs at Guernsey are 90m long by 90m wide at the east end and 110m long by 90m wide at the west end. The current "minimum" length of RESA accepted by the UK CAA is 90m, but it is "recommended" that 240m is provided *"…wherever practicable and reasonable…"* Similar wording and requirements are given in International Civil Aviation Organisation document Annex 14, Volume 1 – Aerodrome Design and Operations.

4.1.3 There is some anticipation that at some time in the future, the current "recommendation" may become a "minimum". In anticipation of this and to provide improved safety, many UK airports have been reviewing and upgrading their current RESA provisions. Several UK airport RESA provisions have been collated:

Airport	**Runway designation**	**Over-run RESA length**	**Comments**
London Gatwick	08R	240m+	
	26L	180m (approx)	No known works to improve this RESA.
London City	10	120m	First 104m of RESA is grooved concrete – arrestor bed removed
	28	190m	First 90m of RESA is grooved concrete – arrestor bed removed
Manchester	05L (R1)	207m	R1 is due for re-surfacing in 2011. Runway Declared Distances reduced to accommodate 240m RESA lengths as of 7/05/2009.
	23R (R1)	90m	
	05R (R2)	351m	Opened in 2001
	23L (R2)	242m	Opened in 2001
Birmingham International	15	90m	Grandfather rights together with mitigating measures have so far avoided reducing runway declared distances. Proposals for runway extension, which have just been granted Planning Approval, include 240m RESA at both ends.
	33	90m	
East Midlands	09	240m	Extended RESA's incorporated as part of runway extension works in 2001.
	27	240m	
Isle of Man	08	92m	Currently being extended as part of safety works and runway resurfacing to 240m at both ends.
	26	150m	

Londonderry	08	135m	Extended into Lough as part of 2007 safety works from 90m
	26	240m	Extended as part of 2007 safety works from approx 90m
Plymouth	13	18m	Proposals to extend to 120m.
	31	90m	90m RESA provided in 2004 by public highway diversion. Current proposals to extend to 120m.
Humberside International	02	90m	Grandfather rights together with mitigating measures have so far avoided reducing runway declared distances.
	20	200m (approx)	Extended RESA provided during runway extension in 1992

4.1.4 The above information has been obtained from various sources as RESA lengths are not always declared in the Aeronautical Information Publication (AIP). The above does demonstrate a general shifting by many airports towards 240m RESAs or at least significant improvements to existing RESA lengths.

4.1.5 The Director of Civil Aviation (DCA) stated for the "baseline" scheme that was presented in December 2008, the minimum acceptable RESA length was 202m. This has since been confirmed by the independent auditor, Halcrow who have stated that for the Guernsey 1463m runway "*Numerical risk assessment indicates that only those options providing a RESA of 200m or longer at each end (of the runway) would be acceptable to the CAA and thus likely to find favour with the DCA*."

4.1.6 The various Options that have been developed have considered only the minimum RESA width of 90m and not the 210m which is recommended. Wider RESAs have not been incorporated into the proposed Options as this would involve further land take and would significantly increase the amount of fill required. The initial discussions with CAA confirmed that their primary concern is that of length. A wider RESA will offer improved likelihood of containing an over-run aircraft. However in many cases, some directional control is maintained and it is therefore more important to ensure that there is sufficient length in which to bring the aircraft to rest.

4.2 **Engineered Materials Arrestor System**

4.2.1 The CAA document CAP168 – Licensing of Aerodromes (CAP168) states that *"If a RESA beyond the 90m minimum is deemed necessary but there are physical constraints to achieving the desired distance, Declared Distances should be reduced unless other mitigation measures can be demonstrated to achieve an equivalent safety result for the same set of operational circumstances"*. Reducing the Declared Distances at Guernsey would render the runway unsuitable for aircraft such as the Dash 8, which currently provide services to the airport.

4.2.2 CAP168 does however suggest various *"Mitigation measures that may be acceptable, singly or in combination, as alternatives to the reduction of Declared Distances, including: …..g) installing suitably positioned and designed arrester beds, to supplement the RESA where appropriate; …"*

4.2.3 CAP168 only considers "soft ground arrestor beds", which it states *"…are not intended to replace RESA and, therefore, should not be located within the minimum RESA distance."* For compliance with the current version of CAP168 a distance of 60m would exist beyond the threshold as Runway Strip, plus a further distance of 90m as the minimum RESA and then the arrestor bed.

4.2.4 There are no equivalent mitigation alternatives given in ICAO Annex 14.

4.2.5 Engineered Materials Arrestor Systems (EMAS) consist of blocks of aerated concrete, which are laid flat on an extended runway pavement and are specifically designed to bring an over-run aircraft to a stop more quickly than a traditional grass RESA. Initial indications are that for Guernsey and the type of aircraft that currently operate there, EMAS beds would need to be approximately 90m long (i.e. the existing runway could be retained incorporating EMAS RESAs within the existing airport boundary).

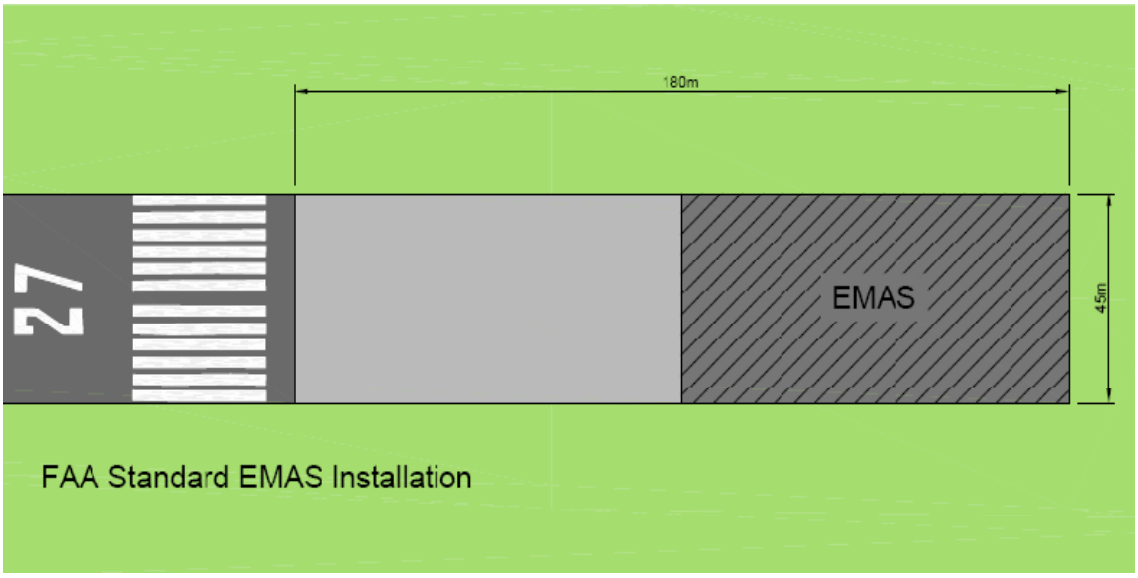
4.2.6 Grass RESAs are constructed to a minimum width of twice the runway width (90m at Guernsey). However EMAS is provided only to the same width of the runway pavement (i.e. 45m at Guernsey).

EMAS installation

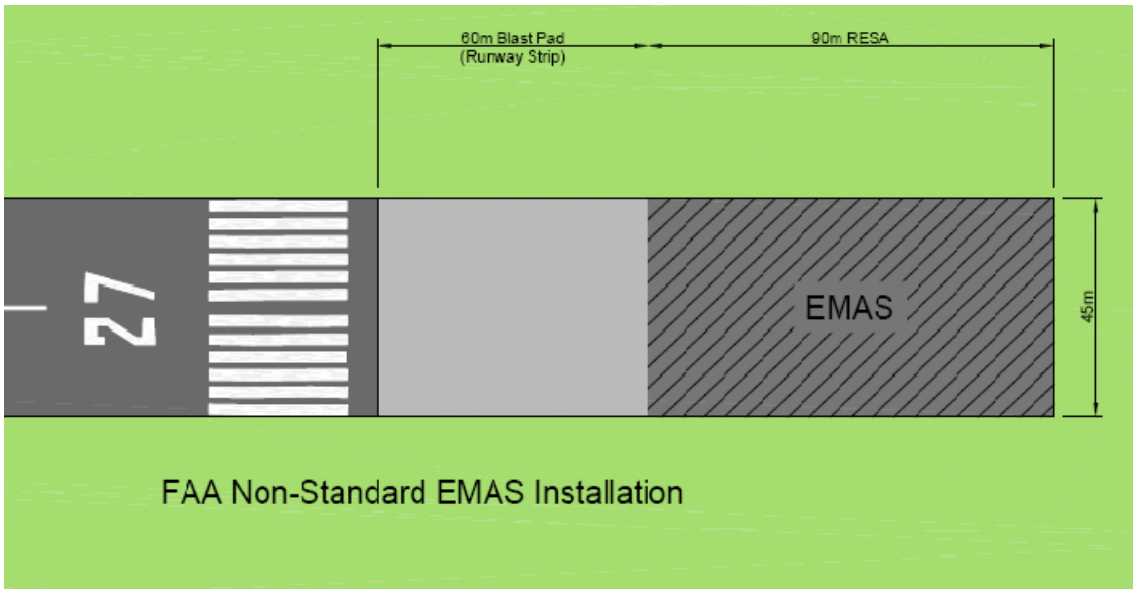
In stopping an aircraft, the aerated concrete blocks are crushed and hence following an incident blocks have to be replaced.

4.2.7 EMAS has been used in the United States of America (USA) at a number of airports in order to reduce the length of RESA that would otherwise be required. The US Federal Aviation Administration (FAA) provided guidance in 2004 on the incorporation of EMAS as an alternative to grass RESAs to meet Runway End Safety Area requirements. For a runway similar to that at Guernsey, grass RESA should be incorporated to a length of 600ft (180m) to protect from undershoot and 1,000ft (300m) to protect from overshoot "….*to the extent practical…".* Shorter RESA lengths using EMAS may considered if it is more economic than grass or can be accommodated with in the airport constraints where grass could not.

4.2.8 The FAA documentation provides details of how a "Standard EMAS Installation" may be installed, which meets the 180m undershoot requirements, but also describes what is referred to as a "Non-Standard EMAS Installation" that might be used where the full undershoot length cannot be achieved.



4.2.9 At Guernsey the "Non-Standard EMAS Installation" would need to be adopted to accommodate the 1463m runway within the current airport boundary and the runway would need to be re-located approximately 24m to the west in order to accommodate the necessary eastern embankment.



4.2.10 The only use of EMAS in Europe is at Madrid and the basis for this design is not clear. However from photographs that have been obtained, it appears that the installation at Madrid is to prevent aircraft over-running into other operational paved areas rather over-run at the airport boundary or at distinct topographical changes which would cause structural damage to an over-run aircraft and therefore be harmful to the occupants.

4.2.11 Because the only guidance for the use of EMAS is from the FAA in the USA, there is significant risk to the States of Guernsey adopting a runway option based on EMAS installation as it is likely to precede any published guidance from CAA or ICAO. There are several fundamental issues of relevance:

- Will CAA/ICAO accept EMAS in locations where grass RESA alternatives can practicably be provided? Options C and E obviously illustrate that grass RESA can reasonably be provided.

- Will CAA/ICAO accept and adopt FAA practice to install EMAS within the RESA rather than behind the Minimum RESA length (90m) that is currently required by CAA for soft ground arrestor beds? The design for Option A – with EMAS, assumes that EMAS is incorporated within the minimum RESA length.

- Will CAA/ICAO insist on the minimum undershoot characteristics (180m in advance of the Threshold) that the FAA apply where practicable? The design for Option A – with EMAS, does not comply with this requirement.

- Will CAA/ICAO accept the reduced width (45m) of an EMAS RESA installation compared with the minimum grass RESA width of 90m? The design for Option A – with EMAS, assumes that EMAS is incorporated only 45m wide.

- Unlike grass RESA, which are suitable for all aircraft, EMAS is not designed to arrest Code A and B aircraft. At Guernsey more than 40% of the movements are with these aircraft.

- The final, detailed design of the EMAS beds has to be commissioned with the manufacturers. Initial indications are that the length of EMAS would be approximately 90m which could potentially be accommodated within the current airport boundary. Detailed design may identify that this is not possible. The design for Option A – with EMAS, assumes that 90m long arrestors will be acceptable.

- The FAA recommends that allowance is made in the whole life costs for replacement of EMAS beds every 10years. They also state that "*we may change the replacement interval as we gain more experience with the material"*. Whilst this infers that a longer life may be attributed in future, there is no evidence that even 10 years would be applicable to UK conditions.

4.2.12 At the time of reporting, it is understood that the CAA have been reviewing options for EMAS installations in the UK and may in the near future make amendments to CAP 168 to reflect their proposals. Early indications are that the CAA may accept EMAS in place of the minimum RESA length.

4.2.13 The FAA circular states that the EMAS bed must be repaired in a timely manner. If significantly damaged due to an incident then the Runway Declared Distances may have to be reduced until repair has been completed.

Discussion within the Project Team concluded that a spare set of EMAS blocks would need to be stored on Guernsey ready to undertake a repair when necessary. In the event of an incursion into EMAS it would be expected that the Airport would claim from the Airline for the damage caused to the EMAS.

4.3 FAA Cost Evaluation of RESA/EMAS

4.3.1 It is interesting to note that in March 2004 the FAA published a document: Order 5200.9 "Financial Feasibility and Evaluation of Runway Safety Area Improvements and Engineered Material Arresting Systems". This document appears to provide some useful advice on the determination of what is considered reasonable and practicable by the FAA in respect of runway end safety areas.

4.3.2 The document describes how to evaluate whether it is financially feasible to provide standard or non-standard EMAS at both ends of a runway in order to improve runway safety at the airport. It goes on to give guidance on how to evaluate the difference in cost on a whole life basis of providing the RESA in EMAS or more conventional grass.

4.3.3 Using the Embraer 195 as the design aircraft and following the evaluation process described, the Maximum Feasible RESA Improvement Cost for an airport equivalent to Guernsey would be $14m in 2004. This equates to approximately £10.5m taking account of inflation and using the current exchange rate ($1.63 equivalent to £1.00 – June 2009). It is inferred that the FAA would expect a commercial airport to spend up to this sum in order to improve its RESAs. The costs given for the various Options within this report have separated the cost of the RESA works so that this can be compared with the sum that would be applicable to an FAA aerodrome.

	Capital Cost	Land Acquisition	Whole Life Cost	Total
"baseline" Option	14.2	0.5	0	14.7
Option C	8.9	0.5	0	9.4
Option E	9.0	0.5	0	9.5
Option A with EMAS	16.2**	0	5.0*	21.2

* See section below

** The provision of spare blocks at £3.2m has been included in the capital cost, but the cost of storage has been omitted.

4.3.4 Both the Baseline Option and Option A with EMAS proposals for Guernsey exceed the maximum feasible RESA improvement cost that would have been applied in the USA in the 2004 assessment. Options C and E would be the only viable options to meet the FAA cost requirements.

4.4 Whole Life Cost for EMAS option

4.4.1 The whole life cost evaluation for comparing EMAS options with non-EMAS options is based on a 20year life. While this is less than the design life of the works (40years, with maintenance) the future costs are discounted at a rate of 7% by the FAA to current day values, hence the capital cost of work programmed beyond 20years are less significant.

4.4.2 ESCO, the manufacturers of EMAS have advised that the cost of each bed would be approximately $4.55m each plus $0.60m per bed for shipping, but excluding installation. This equates to approximately £6.3m for both ends, plus installation costs, estimated at a total of £0.2m.

4.4.3 Assuming a replacement cost of £6.5m for the EMAS at both ends of the runway for Option A with EMAS, additional whole life costs for this option need to include:

Year 10 replacement:	$6,500,000/(1.07)^{10}$ =	£3.3m
Year 20 replacement	$6,500,000/(1.07)^{20}$ =	£1.7m
		£5.0m

4.4.4 It is assumed that the annual cost of inspecting and maintaining EMAS is similar to the costs for grass cutting and maintenance of an alternative grass RESA.

4.4.5 For comparative purposes the capital cost of Option A with EMAS plus £5.0m whole life cost should be compared with the direct capital costs of Option C and Option E.

4.4.6 Using the FAA method of assessment, the cost of the RESA works for Option A with EMAS compared with the capital costs for the RESA works for Options C and E is £21.2m compared with £9.4m and £9.5m respectively.

4.5 **Runway Longitudinal Profile**

4.5.1 The design of the longitudinal profile has been further developed following a detailed topographical survey that was carried out in March/April 2008. This survey data has now been used to build digital models of the paved surfaces at the airport and has identified that the centre line levels that were originally provided, did not adequately take into account the implications of the varying cross sectional profiles. The re-profiling requirements were significantly increased as a result of this exercise and this was reflected in the baseline project cost estimates, but the text was not fully updated to reflect the changes.

4.5.2 Guernsey is unusual in that the runway is Code 3, but the Instrument Landing System (ILS) is only Category I.

4.5.3 CAP168 requires that *"The longitudinal slopes on runways should not exceed ….1.5% where the code number is 3"* and that *"The first and last quarters of the runways where the code number is 3 or 4 should not exceed a slope of 0.8%"*.

4.5.4 The ICAO Annex 14 equivalent recommendation states *"Along no portion of a runway should the longitudinal slope exceed …1.5% where the code number is 3, except that for the first and last quarter of the length of a precision approach runway category II or III the longitudinal slope should not exceed 0.8%..."*

4.5.5 Under ICAO Annex 14, because Guernsey is only Category I, the additional constraints in the first and last quarter do not apply. However under CAP168 because Guernsey is code 3, the additional constraints for the first and last quarters apply. Following discussion with the Project Team and the DCA the less onerous ICAO interpretation has been applied.

4.5.6 Using this interpretation, the baseline scheme required approximately 1.70m of build up of the existing runway at a location 260m east of the current western runway threshold.

4.6 West End Extended Runway Longitudinal Profile

4.6.1 The 'baseline' scheme included the displacement of the runway approximately 125m to the west of its current location. The height of the embankment to accommodate the displaced runway and the proposed Starter Extension was dictated by the level of the existing western runway threshold, which was to be overlaid with approximately 120mm of asphalt.

4.6.2 RPS organised a workshop with French surfacing contractor, Colas and other members of the Project Team in Paris in February 2009. The discussions concluded that by using low temperature asphalts; a runway closure over a weekend period would allow a contractor sufficient time to dig out the western 50m of the existing runway and replace it to lower levels. This would reduce the amount of re-profiling required to the existing runway (build-up reduced from approximately 1.70m to 1.56m), as well as reducing the embankment height and the associated fill required beyond the runway to the west to create the grass RESAs required for either Option C or E.

4.6.3 In addition, the removal of the Starter Extension allows the embankment beyond the proposed runway threshold to fall more steeply than was proposed in the 'baseline' scheme.

4.6.4 As a consequence of the above, the volumes of fill required for the embankment for either Option C or E have now been greatly reduced. The 'baseline' scheme required a total of approximately 382,000 tonnes of imported fill (excluding excavated material from elsewhere in the works that would be re-used). For Options C and E, this is reduced to negligible quantities. For Option A there is still a significant import, but only a quarter of what had been required for the "baseline" scheme.

Scheme	Total Fill Requirements
"baseline"	382,000 tonnes
Option A	90,000tonnes
Option C	(2,000 tonnes surplus)
Option E	2,300 tonnes

4.7 Frangible ILS Support Structure

4.7.1 An array of ILS localiser aerials are provided beyond the end of the runway, which direct aircraft onto the runway in poor visibility. The aerials have to be positioned at the back of the RESA and need to be high enough to be sighted by an incoming aircraft and therefore have to be set at least as high as the runway threshold. With the revised and significantly reduced embankment profiles for Options C and E described under the previous heading, the ILS aerials need to be raised about 10m above the surrounding ground level.

4.7.2 CAP168 requires all structure within the RESA to be frangible (designed to collapse in such a way that they would not cause hazard to aircraft in flight or an over-run aircraft). At Guernsey the ILS localiser will be positioned at the back of the RESA at both ends of the runway such that it can be accommodated within the highway boundaries between Ruette de la Tourelle and La Villiaze Road. It is considered appropriate that the structure supporting this equipment be constructed of frangible material.

4.7.3 Structures of this form have now been installed in a number of German airports and more recently in Belgium. The structures are constructed of fibreglass and built by Euro Poles in Germany. Allowance has been made for these structures in Options A with EMAS, C and E. (Note they were not relevant to the "baseline" Option as the embankment was of sufficient height to directly support the ILS installation.

An ILS localiser installation on a 6m high Euro Pole structure.

4.8 **Runway Cross-Section Profile**

4.8.1 The third party audit undertaken by Halcrow has confirmed that the 45m wide runway is wider than minimum allowable in CAP168, *"but worth preserving due to the strong cross winds that are more prevalent at Guernsey".*

4.9 **Runway Gradient**

4.9.1 Halcrow have confirmed that it would be difficult to provide a safety case to argue that the runway longitudinal profile and gradient should be anything but compliant. However they accept that the slightly less onerous interpretation applied using the ICAO standards rather than the CAA standards is reasonable and do not recommend any changes to the proposals in this respect.

4.10 **Runway Strip Profile**

4.10.1 Halcrow have suggested that if significant savings can be achieved by re-grading within the Runway Strip to avoid abrupt changes in gradient rather than meeting full compliance, this may be acceptable.

4.11 Runway Options

4.11.1 Three runway options have been considered in this report:

Option A – With EMAS: In order to accommodate the EMAS and supporting pavement structure, the existing runway is displaced to the west by approximately 24m (this is required to accommodate the necessary embankment works to the east end). The Runway Strip therefore also moves to the west and this proposal therefore requires some land acquisition to the west.

Option C: With this option, the runway will be displaced to the west such that the western runway end is in a suitable position to accommodate a future 1700m runway with 240m RESA's at both ends. The runway is displaced approximately 120m to the west from its current position. At 1463m, the option will incorporate a Starter Extension at the east end (on the existing displaced runway), but no Starter Extension to the west. The RESA at the west end will be 240m, but will be "clipped" at the south west corner and the RESA at the east will be approximately 198m. Land acquisition is required to the west to accommodate both the RESA works and the Runway Strip displacement. Initial discussions with the Regulator have confirmed that a "clipped" RESA of the dimensions indicated would be acceptable.

Option E: With this option, the runway will be displaced to the west such that equal, rectangular RESA's of approximately 202m are provided at both ends. The runway is displaced approximately 125m to the west from its current position. At 1463m, the option will incorporate a Starter Extension at the east end (on the existing displaced runway), but no Starter Extension to the west. Land acquisition is required to the west to accommodate both the RESA works and the Runway Strip displacement.

4.12 Runway Length

Only the 1463m Options have been considered in this report. Some Options would be more suitable for extension to 1700m in the future than others:

Option A – With EMAS: The EMAS proposed for the 1463m runway would not be long enough for larger aircraft that would be applicable to a longer 1700m runway. Extension works would be required to both the east and west in order to accommodate a 1700m runway and extended EMAS RESAs. It is likely that the EMAS beds at both ends would need to be replaced during extension.

Option C: Would be the most suitable option to accommodate a future extension to 1700m. The western end of the runway in this option is positioned such that if an extension to 1700m were undertaken, works would only be required to the eastern end of the runway (assuming that the western "clipped" 90m wide RESA remained acceptable to the Regulator).

Option E: The western end of this option is 5.143m further west compared with Option C. If this option were built and the extension to 1700m were later required; work would be required to the western end to accommodate the full 240m RESA in addition to the work that would also be required at the east end. Extension of this option would therefore be more disruptive.

4.13 Runway Pavement Strength

4.13.1 There is no proposal to change the design requirements from those previously identified. The runway pavement should be designed to provide Pavement Classification Number (PCN) 36.

4.14 Runway Surface

4.14.1 The previous report recommended that surface options other than grooved Marshall asphalt and porous friction course (as currently provided at Guernsey) be considered.

4.14.2 Representatives of the PSD Board visited Jersey Airport to view the laying of BBA material, which has been chosen for the new surface course material. The same material has been chosen at Sumburgh, Tiree and Isle of Man. In all these locations, the surface has been grooved to meet the requirements of JAR-OPS.

4.14.3 BBA surfacing has been extensively used in France for more than18years and was viewed at Toussus Airport, close to Paris during the Project Team visit to Colas. It is also in use on all four runways at Charles de Gaulle Airport. In all of these locations, the surface is un-grooved.

4.14.4 BBA offers a number of significant advantages over Marshall asphalt or porous friction course:

- It requires a smaller batch/mix plant with only 4 aggregate bins compared with the 6 or 8 typically required for more conventional surfacing materials; the area required for the site compound is therefore smaller. This would also reduce the number of different aggregates to be shipped to Guernsey for the project.

- Up to 10% recycled aggregates can be incorporated into the mix, whereas neither Marshall asphalt nor porous friction course permit the use of any recycled materials.

- BBA has enhanced performance with regard to stiffness, resistance to ageing and resistance to cracking.

- Improved workability during laying allows a larger area to be surfaced during each night closure, speeding up the surfacing process and resulting in fewer joints.

- BBA designed with the correct mix can eliminate the need for grooving.

4.14.5 At Jersey, during the works, the regulating and base course was laid using a mix that did not require grooving. Grooving is extremely onerous as it can only be undertaken when the surfacing has been laid for three days. If grooving is undertaken, then following the Bristol problems, only limited lengths (typically 10% of the runway length) can be left un-grooved at any one time (subject to adequate risk assessment by the airport). This significantly slows progress (to approximately 50m per night) and results in many more joints in the surfacing that are prone to future deterioration.

4.14.6 It is intended that BBA will be used to re-profile the runway and will not be grooved. Investigations into using un-grooved BBA as a surface course are under consideration.

4.15 **Runway Instrument Landing System Upgrade**

4.15.1 It has now been verified by National Air Traffic Services (NATS), who have been responsible for the ILS installation and maintenance at Guernsey, that due to the topography around the airport there is little prospect of enhancing this to Category II and no prospect of enhancing to Category III. The costs of enhancement work required to upgrade to Category II would be significant.

4.15.2 The weather conditions on the island are such that the benefits of Category II would be minimal as the mist and fog that occurs generally transits through Category II conditions fairly quickly. The number of additional hours that could be flown as a result of a Category II installation would be minimal (estimated at about 30 hours per annum).

4.16 **Obstacle Clearance**

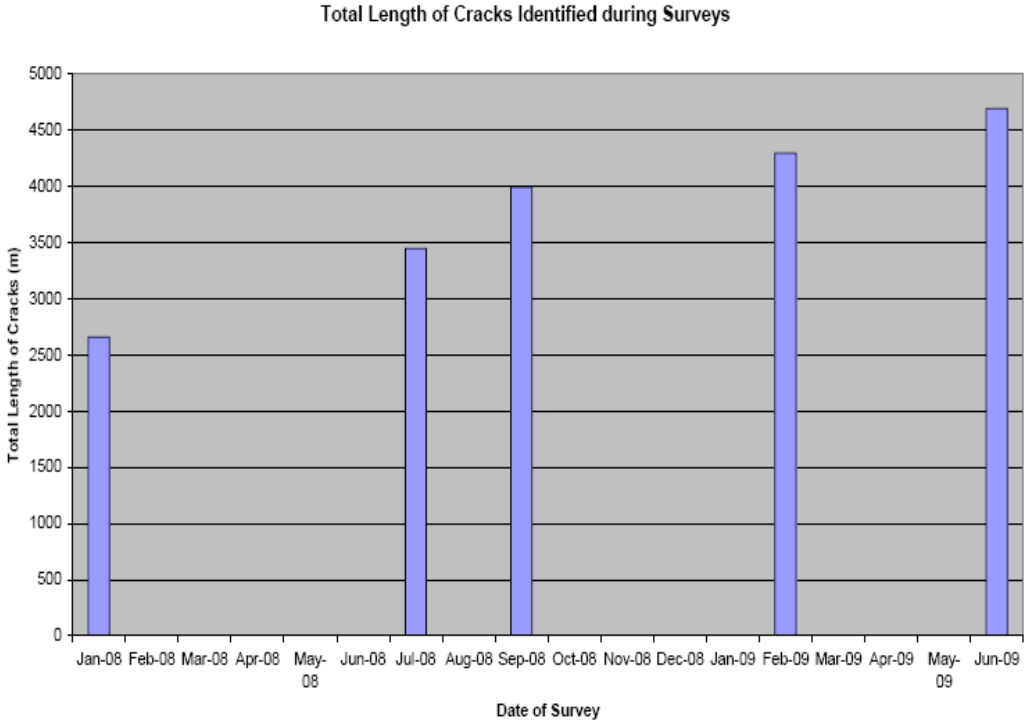
4.16.1 At the time of reporting, a detailed analysis of obstacles to flight has not been carried out. In due course a detailed analysis will be undertaken.

4.17 **Runway Condition**

4.17.1 In June 2008 Flybe applied to the Airport to replace the Gatwick BAe146 aircraft with an Embraer 195. Due to the bearing strength and condition of the runway, this could not be accepted without a weight restriction of 39 tonnes being imposed. This apparently rendered the service commercially non-viable and Flybe elected to instead replace the BAe146 service with a Dash 8, Q400 service with an additional rotation.Regular aircraft of higher classification number cannot be accepted until the runway rehabilitation works have been completed.

4.17.2 The Airport has introduced quarterly engineering inspections of the runway pavements. The current runway surface is of porous friction course. This material is open textured and for this reason cracking is difficult to visibly identify. Any cracking that is detectable at the surface is likely to result from wider cracking further down in the pavement structure.

4.17.3 Cracking in the surface provides a route for surface water to enter the pavement structure which ultimately will lead to localised structural failures of the pavement. Five engineering inspections have now been undertaken and each inspection has shown progressive increases in the length of cracking.



4.17.4 In autumn 2008 temporary maintenance work was undertaken on the runway pavement in order to reduce the risk of localised failures. The works were limited to include over-banding the widest cracks 10m either side of the runway centre line and the renewal of the runway markings.

4.17.5 Further maintenance will be required this autumn to replace the over-banding that was installed last year (which has a limited twelve month life) and to seal the remaining, untreated cracking within the 45m width of the runway to be retained in the scheme.

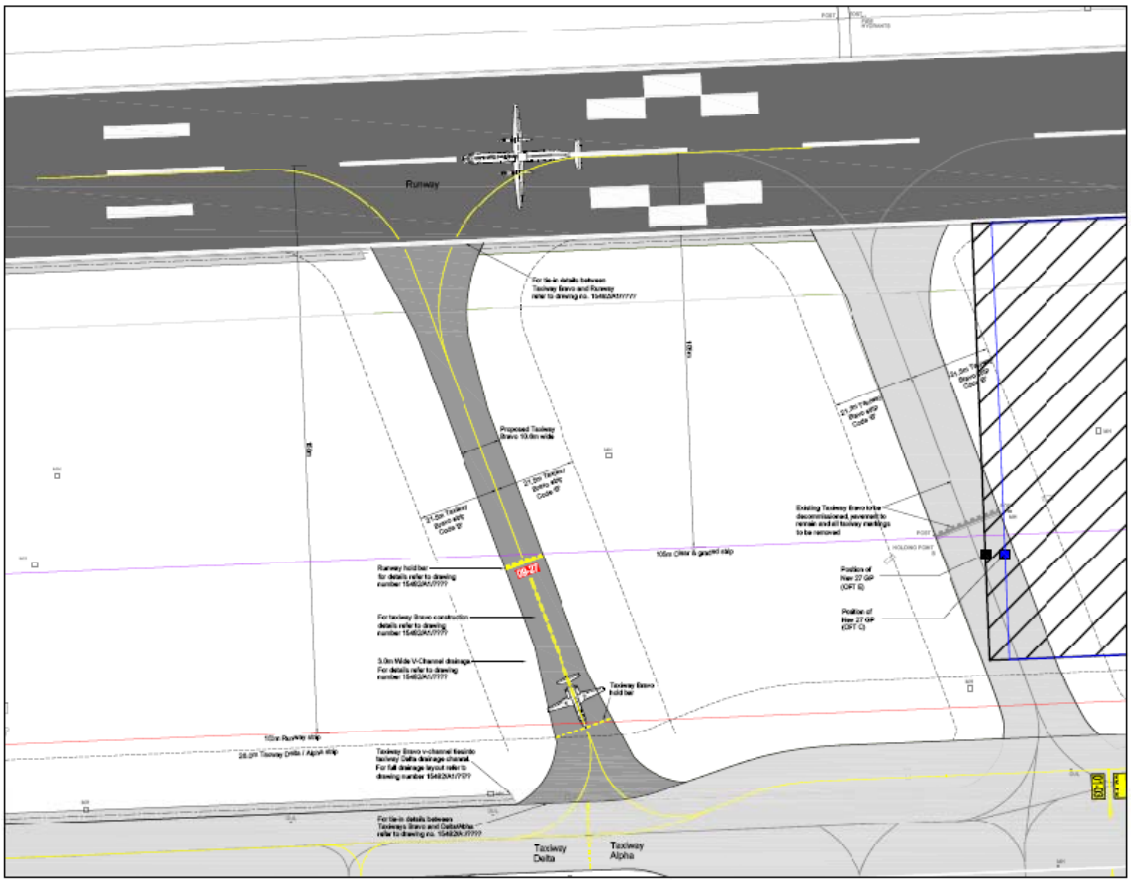
4.17.6 In the February 2009 the inspection team first identified aggregate loss in localised areas that will require patch repairs this autumn. Patch repairs are not desirable in porous friction course as they obstruct the free flow of rain water through the surface and this can lead to localised areas of standing water.

4.17.7 The runway surfacing is now approximately 35 years old, which is over twice the normal life expectancy. Deterioration is occurring which at present is being managed by annual minor maintenance. However the deterioration is likely to become more serious and is unpredictable at this age.

5.0 Taxiways

5.1 Existing Taxiway Arrangement

5.1.1 In order to accommodate the proposed works for Option C or Option E, taxiway Bravo would need to be closed in order that the ILS glide-path aerial and the associated sterile area is not infringed by aircraft movements.



The hatched area has to be maintained clear for the ILS glide-path equipment. The existing Bravo therefore has to be closed.

5.2 Taxiway Widths

5.2.1 As previously reported, the main taxiways will be maintained at 18m wide. However, it is proposed that a to Taxiway Bravo will only be designed to take Code B aircraft as this revised location of the taxiway makes it impractical for larger aircraft to use it for exiting the runway. A taxiway for Code B aircraft could be reconstructed to 10.5m wide. It is proposed to widen this to 10.6m to accommodate the wheel span of a Jetstream 32.

5.3 Taxiway Re-alignment

5.3.1 In the early drafts of the previous report, no allowance was made for the extension of the Delta taxiway to the displaced western end of the runway. Aircraft taking off in an easterly direction would have been required to

"backtrack" from Delta to the runway end and turn through 180^0 before take-off. Similarly aircraft landing in a westerly direction that passed the Delta taxiway bell-mouth on roll-out would need to turn at the end of the runway and backtrack to the taxiway entrance. Air Traffic Control (ATC) has advised that the aircraft separation for aircraft would be unacceptable and lead to considerable delays in air traffic especially during peak times. It is understood that the current management of aircraft into and out of the island is relatively efficient and can take into account the mix of aircraft type and speed, together with the range of destinations (medium and short-haul).

5.3.2 During low visibility procedures, where the spacing between aircraft is increased to take into account the weather conditions and landing clearance has to be obtained much earlier in the "approach". The introduction of a backtrack for departure would cause the spacing of arriving aircraft to be doubled. This would impact severely on operations at peak periods, and might require aircraft to circle overhead in a 'stack' because of the lack of airspace in which to maintain the necessary separation time between approaching aircraft.

5.3.3 Any requirement to backtrack aircraft departing from the west, would lead to extensive air traffic delays.

5.3.4 All the above would increase the flight time for aircraft approaching the airport and would increase the taxiing and holding time for aircraft on the ground. As well as detrimentally affecting the Airports efficiency, this would also result in increased environmental impact from noise and air quality.

5.3.5 Further discussions with the CAA have identified with appropriate operational constraints, that a non-compliant taxiway extension could be effectively incorporated to overcome these potential delays.

Diagram of proposed Extension to Delta Taxiway

5.3.6 Immediately before the report was finalised, a sum was added to the budget cost to allow for the incorporation of this extended taxiway.

5.3.7 The Provision of this 'Delta' Taxiway extension and the relocation of the 'Bravo' Taxiway further west of its current position could be considered optional.

5.3.8 These provisions total £3.0m in the final cost estimates, but are considered by RPS to be essential to maintain the current efficiency of air traffic movements, both in the approach to Guernsey Airport and on the ground.

5.4 **Taxiway Vertical Alignment**

5.4.1 The previous report identified shortcomings in the vertical alignment of taxiway Delta. There is no proposal to rectify this as part of the scheme. Instead stop bars will be put in place by agreement with the CAA and DCA.

5.4.2 In this respect, the third party audit by Halcrow has advised that *"Given the low speeds involved, the likelihood of a serious incident arising from such a situation is low. We are not aware of any past difficulties or incidents as a result of the Taxiway D profile but, if its use is practically unavoidable, operational measures might be taken to avoid aircraft stopping on this section and to alert pilots to its characteristics via the AIP."*

5.5 **Taxiway Pavement Strength**

5.5.1 As previously proposed, the taxiways will be designed for a PCN of 36.

5.6 **Taxiway Condition**

5.6.1 The taxiways have not been the subject of the independent engineering inspections that have been carried out on the Runway. It is understood that an emergency overnight repair was required to the Delta Taxiway as a result of a localised depression occurring in May 2009.

6.0 Aprons

6.1 Stand Layout

6.1.1 A fundamental element of the proposals is that nose-in / push-back operations will be adopted for at the commencement of the works. The time saved by the reduced number of apron replacement phases associated with adopting this strategy will cover the costs of tug operations during the works. It is understood that after the works nose-in / push-back operations will be maintained. The airlines operating from Guernsey have input into the proposed stand layout and recommended some changes from the original proposals.

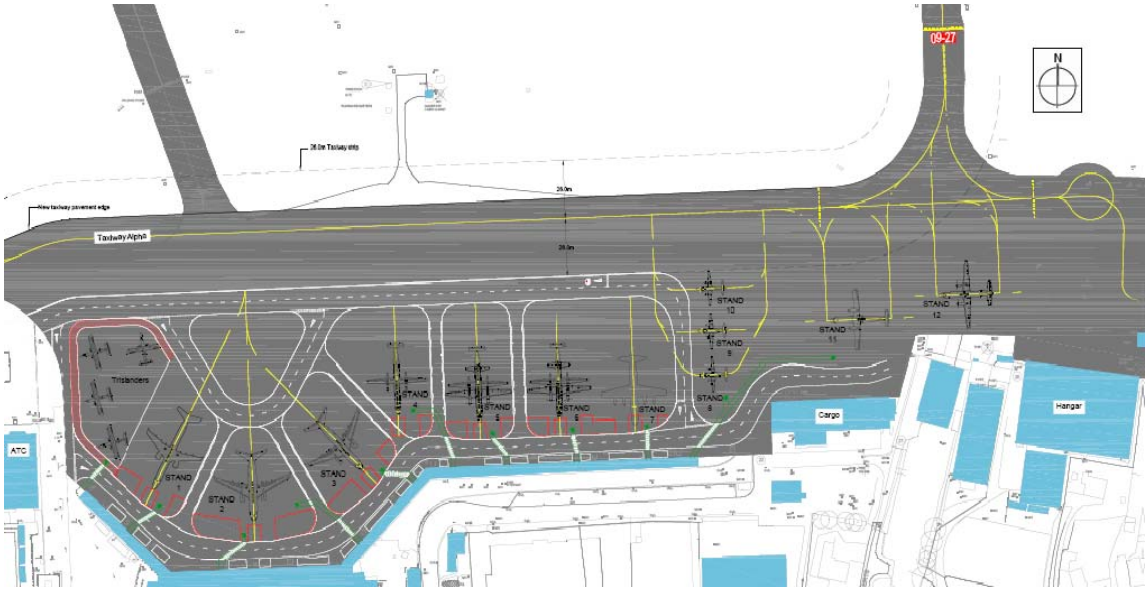
6.2 Aircraft Stand Layout – Design Aircraft

6.2.1 The previously proposed stand layout has been reviewed following design development meetings with the three airlines that currently operate out of Guernsey:

- Design development meetings with the airlines have identified that they would at their own cost prefer that Fixed Ground Power (FGP) units be installed. This enables aircraft to run air-conditioning, etc on the ground without running the aircraft auxiliary engine. This has obvious environmental noise and air quality benefits to the airport. A feasibility report is currently being prepared to identify the electrical supply required, the likely installation costs, the costs of running the units and how these costs would be re-charged to the airlines. It is intended this provision will be funded initially by Guernsey Airport through routine capital expenditure with costs recovered from the operators through service charges.

- The three stands within the horseshoe had a common lead in line and options are now being reviewed with three separate lead in lines to aid more rapid aircraft turnaround. The inclusion of FGP requires that the stand locations are defined for the long-term as the units cannot easily be relocated.

- Consideration is being given to the long-term location of the smaller inter-island services. Operational safety is of concern with passengers walking amongst these aircraft in and around stands that are being occupied by larger aircraft.



Original proposal

New Proposal

6.3 Apron Pavement Strength

6.3.1 As previously proposed, the concrete aprons will be designed for a PCN of 50.

6.4 Head of Stand Road

6.4.1 The previous report proposed a Head of Stand Road for use by fire appliances and fuel bowsers. This is now being reconsidered, but does not affect the area of paving required. It is now considered more appropriate to limit the traffic

flowing on the head of stand road to an absolute minimum. Passengers can then pass safely between the aircraft and terminal. The same head of stand area will still be required for tug access and for fire appliance access in the event of emergency, but may not be marked out as illustrated.

6.5 **Rear of Stand Road**

6.5.1 This will provide two directional access for all service vehicles to the aircraft stands. This will be the primary access route for service vehicles and will be demarked as 10m wide.

6.6 **Apron Condition**

6.6.1 The apron has not been the subject of the independent engineering inspections that have been carried out on the Runway. However there have been a number of localised failures of the apron pavement which have resulted in the need to place steel plates over the defects to avoid damage to manoeuvring aircraft and service vehicles.

7.0 Drainage

7.1 Existing Surface Water Drainage Philosophy

7.1.1 Approximately 80% of the surface water runoff discharges into Lovers Leap outfall on the north side of the airport into the Beau Vallee. The other 20% is collected from the eastern pavements and outfalls from the Petit Bot into the sea.

7.1.2 The Beau Vallee outfall flows directly into the St Saviours Reservoir, which supplies potable water to the island. Discharge at Petit Bot can be pumped into the St Saviours Reservoir in times of low rain-fall.

7.2 Review of Drainage Survey

7.2.1 A complete drainage survey was undertaken between April and July 2008 to review the condition of the drainage network associated with the pavement surface water drainage. All drains were inspected using closed circuit television cameras (CCTV) which were passed through the pipes in order to assess the condition and the suitability for incorporation into the rehabilitation scheme. For the “baseline” scheme, it had been assumed that 30% of the existing pipe network would require replacement and that the remainder would be lined with an epoxy spray lining. The cost of lining was assumed to be approximately 60% of the replacement cost.

7.2.2 The CCTV survey has however identified the existing pipes to be in poor condition and approximately 65% are not suitable for lining. The small diameter pipes (150mm and 225mm diameter pipes) adjacent to the runway are of pitch fibre construction and are not suitable for re-use. Many of the other vitrified clay and concrete pipes have collapsed, which indicate that they are of inadequate strength or have an inadequate surround for the loading to which they are currently being subjected.

7.2.3 It has been concluded that a new drainage system should be installed and the cost estimates provided in this report have taken this into account.

7.2.4 Under a separate commission, Arcadis Ltd has been appointed directly by the Airport to review water quality at the discharge into Lovers Leap. It is understood that this identified higher levels of Perfluorooctane Sulphonate (Pfos) (a substance found in fire-fighting foam) than would normally be expected. It is understood that follow up survey work has identified the source of this to three localised areas within the Airport boundary where fire fighting foam has been used in the past. The rehabilitation works will aim to reduce the discharge levels at Lovers Leap. The fire fighting foam currently used by the airport does not contain Pfos.

7.2.5 The alternative proposed methods of removing/treating the sites affected by Pfos are still under consideration however this report has now identified that a budgetary provision of £4m should be provided for this treatment and removal.

7.3 Proposed Drainage System

7.3.1 The scheme now allows for all of the surface water from the airport to be collected and discharged into Lovers Leap. Guernsey Water has expressed a preference for this as it will increase water volumes in St Saviour's Reservoir. It is also preferred as any polluted water can then be separated at a single point of discharge on the north side of the airport. However, because of the increased flows during storm conditions, surface water will then need to be attenuated.

7.3.2 Further design work has now identified that in order to cater for the design storm conditions whilst limiting the discharge rates from the airport to current flow rates surface water storage attenuation (storage prior to discharge) will be required. Buried tanks will be required to the north side of the airport, upstream of the Lovers Leap discharge to contain approximately 5,000m³ of water.

7.4 Polluted Water Monitoring / Control and attenuation

7.4.1 Surface water from the airport may be contaminated by:

- Fuel and oil spillages
- Aircraft wash down residue
- Aircraft de-icing fluids
- Fire Fighting activity

7.4.2 Fuel and oil float on water and can be separated using oil interceptors which it is proposed to install at various locations at the airport.

7.4.3 Additionally prior to discharge off the airport all surface water will be monitored. Any water containing contaminants would be diverted into a separate storage tank. This is sized to accommodate the first 25mm of rainfall off the pavements and would be of 4,000m³.

7.4.4 A connection to the foul water sewer will be provided if appropriate, but otherwise tanker access will be constructed to enable the tanks to be emptied.

8.0 Airfield Ground Lighting & Navigational Aids

8.1 Airfield Ground Lighting

8.1.1 The airfield ground lighting (AGL) will be totally renewed as part of the scheme. The requirements are broadly in line with the proposals set out in the previous report. However these will vary slightly depending upon which runway Option is selected.

8.1.2 Consideration is being given to the use of (light emitting diode) LED AGL for the taxiways and aprons. Whilst the capital cost of this equipment is higher than for normal fittings, the running costs and associated maintenance requirements are much reduced. Conventional lights will be used on the runway as LEDs are not yet approved for runway use.

8.2 AGL Condition

8.2.1 CAP168 states: *"The insulation value of a primary series circuit may decrease by a very significant amount before any operational effect on the AGL is noticed; however, in this case there would be a much greater risk of harm to maintenance or installation persons……...Remedial action should be taken where the insulation between primary and secondary series circuits and between primary series circuit and earth falls below 30 MΩ. The insulation properties of secondary series circuit cables should be checked on a regular basis and when an insulation failure is suspected. The resistance between secondary series circuit and earth should be not less than 5 MΩ."*

8.2.2 At Guernsey the latest readings for resistance are tabulated below:

Circuit	**Resistance (MΩ)**
Runway Edge A	0.12
Runway Edge B	0.59
Runway C/L A	3.46
Runway C/L B	1.40
Taxiway C/L	0.01
Taxiway Edge	0.13
PAPI A 09	0.43
PAPI A 27	7.10
PAPI B 09	1.43
PAPI B 27	8.75
Threshold A 09	15.40
Threshold A 27	19.02
Threshold B 09	20.00
Threshold B 27	6.35
Approach A 09	4.38
Approach A 27	0.30
Approach B 09	0.19
Approach B 27	1.43
Stop Bar A	4.48
Stop Bar B	0.02

8.2.3 All of the circuits have resistances considerably below the 30MΩ remedial intervention level and should therefore be replaced as a matter of some urgency.

8.3 Navigational Aids

8.3.1 It is not proposed that this equipment will be renewed as part of the scheme. It is intended that the existing equipment will be re-located as necessary. The requirements will vary slightly depending upon which runway Option is selected.

8.3.2 During the works there will be equipment "down-time" which may result in increased minimum weather criteria for the safe operation of the airport (i.e. in marginal weather conditions when aircraft can currently land using these aids, they may not be able to land whilst certain equipment is out of service). In order to mitigate against this:

- Consideration is being given to restricting the times when certain equipment can be out of service and

- The Airport is obtaining advice from CAA regarding the use of Global Navigation Satellite System (GNSS) approaches using aircraft sited systems together with Airport Precision Approach procedures. This may enable the existing weather minima to be maintained whilst ground based equipment is out of service.

8.3.3 It is proposed that the Radar will be renewed under a separate contract, which will be undertaken in conjunction with Jersey Airport.

8.4 Potential Upgrade to Category III Runway Lighting

8.4.1 Whilst it is not proposed to upgrade the ILS equipment from Category I, there may be justification for improving the Runway AGL to Category III standards. This may not improve landing capability, but may allow departing aircraft to depart in low visibility conditions. Implications and costs are currently being investigated.

9.0 Construction Phasing

9.1 Contractor's Compound

9.1.1 It had originally been anticipated that the Contractors site compound would be situated to the north of the runway on land owned by the airport, in and around the spectators car park. However whilst some low level office and storage areas could be provided in this area, the height of the batch plant required and the proximity to sensitive navigational equipment has ruled this area unsuitable. Enquiries are underway in order to establish a suitable site on the south side of the airport opposite the main entrance to the terminal.

9.1.2 The Contractor would be required under the Contract to return any land utilised as a temporary site compound to its original condition prior to completion of the works.

9.1.3 For either Options C or E, it is anticipated that a further access and a site compound or earth moving equipment would be required to the west of the runway. This would probably be provided via La Mare Road that would be closed for public access as part of the scheme. Earth moving equipment and lorry movements delivering fill to the area would be required to remain outside and below the critical aircraft approach surface. It is anticipated that much of the work in this area could be done during the day, but final profiling and laying of the extended pavement would need to be undertaken during night time working.

9.2 Material Importation

9.2.1 It is inevitable that most of the aggregates and other construction materials for the works will need to be shipped onto the island. It is assumed that ships supplying the works will dock at St Sampson Harbour. Traffic studies are currently underway to establish how materials can be supplied from St Sampson Harbour to the Airport causing least disruption.

9.3 Weekend Closures

9.3.1 It has been recognised that the topography to the west end of the current runway dictates the embankment levels to accommodate Options C or E. This is described in Section 3.0 under West End Extended Runway Longitudinal Profile. By closing the Airport for a weekend to reconstruct the 50m of the existing runway, significant savings in construction cost as well as environmental impact can be achieved.

9.3.2 Once a Preferred Contractor has been identified, further consideration will be given to additional closures to identify the benefits of these. If the benefits are sufficient then consideration will be given to further short-term closures of the Airport.

10.0 Contract Procurement

10.1 Pre-qualification

10.1.1 An advert was placed in Flight International in the week commencing 25th August 2008 and Contract Weekly, Contracts Journal, Construction News and New Civil Engineer in the week commencing 1st September 2008 inviting contractors to apply for a Request for Information (RFI) document.

10.1.2 17 companies requested the RFI documents, of which seven returned submissions.

10.1.3 The submissions were assessed against various pre-identified criteria.

10.1.4 The RFI document stated that it was the intention for four to six contractors to be invited to tender, but the caveat was placed that the final number was dependant on the quality of the applications received.

10.1.5 The following five contractors have successfully pre-qualified:

- Costain Ltd.
- Edmund Nuttall Ltd.
- Fitzpatrick Contractors Ltd.
- Lagan Construction Ltd.
- Trant Construction Ltd.

10.2 Type of Contract

10.2.1 It has been concluded that the Contract will be “Traditional” (probably NEC, Priced Contract with Activity Schedule) with the contractor pricing the works illustrated by the Client’s design and project manager. Following the tender process, one or two contractors will be given “preferred” status and these will then work with the Project Manager and Client through a period of value engineering to identify if any opportunities exist for further cost savings; particularly relating to construction methods or programming implications.

10.2.2 Only when sufficient cost certainty has been achieved will the contractor be appointed.

11.0 Programme

11.1 The following dates are intended as the latest dates when activities occur. In due course the more detailed design and project management programmes will be updated and developed.

Policy Council Report	31 July 2009
Report to Printers	28 Aug 2009
Publication of Billet	11 Sept 2009
States Meeting	30 Sept 2009
PSD Instruct Final Design	5 Oct 2009
Detailed Design of Selected Option	5 Oct 2009 – 30 Nov 2009
Prepare Contract Documentation	5 Oct 2009 – 4 Jan 2010
EIA Preparation	2 July 2009 - 30 Jan 2010
Planning Submission	15 Feb 2010
PSD Review of Tender Documentation	4 Jan 2010 – 1 Feb 2010
Printing Tender Documentation	1 Feb 2010 – 15 Feb 2010
Latest Date for Approval to Tender	15 Feb 2010
Tender Period	15 Feb 2010 – 12 Apr 2010
Initial CAA CAP729 Submission	27 March 2010
Preparation of Tender Review Report	12 Apr 2010 – 10 May 2010
Planning Approval	15 May 2010
CAA Initial Development Meeting	29 May 2010
PSD Review of Tender Review Report	10 May 2010 – 7 Jun 2010
Contractor Interviews	7 Jun 2010 – 14 Jun 2010
PSD award “Preferred Contractor”	21 Jun 2010
Period of Value Engineering	21 Jun 2010 – 20 Sept 2010
Land Acquisition	20 Sept 2010
Final CAA CAP729 Submission	20 Sept 2010
Report to PSD on Final Costs, etc	27 Sept 2010
PSD review	27 Sept 2010 – 25 Oct 2010
Appoint Contractor	30 Oct 2010
Contractor Mobilisation	30 Oct 2010 – 10 Jan 2011
Start on Site	10 Jan 2011

12.0 Order of Magnitude Cost Estimate

12.1 Cost Estimates

12.1.1 The costs given in the following table have been calculated using cost data from a large number of UK airport infrastructure projects. As in the previous report, allowance has been made for the increased costs for construction on Guernsey.

12.1.2 The costs provided are relevant to June 2009 and allowances have been included for inflation between now and the proposed construction period.

12.1.3 The same unit rates have been applied to each of the Options considered and these can therefore be directly compared for capital costs. However it should be noted that Option A with EMAS will have significantly higher ongoing maintenance costs compared with the other Options. The FAA recommends that allowance is made for replacement of EMAS beds at 10 year intervals. The discounted costs for the replacement of the EMAS beds in “Option A with EMAS” are calculated at £5.0m. This figure should be added to the figures given in the table for this option.

12.1.4 A more detailed breakdown of the figures has been provided to the Project Team.

12.1.5 It should be noted that the figures given are order of magnitude and are not a quotation for undertaking the works. The project will be subject to tender and then to further value engineering. At Contractor award the value of the works will be agreed, but even then there will inevitably be further costs as a result of unexpected findings. Only at the very end of the project, will the true cost of the project be accurately identified.

	PROJECT COST SUMMARY FOR OPTIONS UNDER CONSIDERATION (SOME FIGURES SUBJECT TO ROUNDING)					
	BASELINE (JUNE 2008)	**OPTION A (EMAS)**	**OPTION C (1463m)**	**OPTION C (1700m)**	**OPTION E (1463m)**	**OPTION E (1700m)**
RUNWAY	30,150,000	34,745,000	25,575,000	34,675,000	25,700,000	35,450,000
TAXIWAY	8,550,000	6,650,000	7,650,000	7,650,000	7,650,000	7,650,000
APRON	10,300,000	11,300,000	11,300,000	11,300,000	11,300,000	11,300,000
DRAINAGE	4,400,000	8,550,000	8,550,000	9,100,000	8,550,000	9,100,000
POLLUTION CONTROL	-	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000
AGL/NAVAID	4,000,000	4,500,000	4,500,000	6,375,000	4,500,000	7,300,000
MISCELLANEOUS	400,000	400,000	400,000	400,000	400,000	400,000
SUB-TOTAL (£)	**57,800,000**	**70,145,000**	**61,975,000**	**73,500,000**	**62,100,000**	**75,200,000**
DESIGN ACCURACY CONTINGENCY	5,780,000 (@10%)	2,806,000 (@4%)	2,479,000 (@4%)	2,940,000 (@4%)	2,484,000 (@4%)	3,008,000 (@4%)
SUB-TOTAL (£)	**63,580,000**	**72,951,000**	**64,454,000**	**76,440,000**	**64,584,000**	**78,208,000**
BUILDING INFLATION	9,540,000	5,604,000	4,951,000	7,088,000	4,961,000	7,248,000
ESTIMATED CONSTRUCTION COST (£)	**73,120,000**	**78,555,000**	**69,405,000**	**83,528,000**	**69,545,000**	**85,456,000**
10% CONSTRUCTION CONTINGENCY	7,312,000	7,856,000	6,941,000	8,353,000	6,955,000	8,546,000
PROFESSIONAL FEES	1,500,000	1,800,000	1,800,000	3,250,000	1,800,000	3,250,000
DOWNTIME DUE LVP'S ETC	1,500,000	1,500,000	1,500,000	2,250,000	1,500,000	2,250,000
LAND PURCHASE	500,000	0	500,000	6,000,000	500,000	6,000,000
NOSE IN – PUSH BACK (inc. ATC Ground Control)	600,000 -	600,000 240,000	600,000 240,000	600,000 240,000	600,000 240,000	600,000 240,000
TOTAL ESTIMATED PROJECT BUDGET (£)	**84,532,000**	**90,551,000**	**80,986,000**	**104,221,000**	**81,140,000**	**106,342,000**

13.0 Planning

13.1 Planning Overview

13.1.1 The planning system for Guernsey is based upon two plans – The Urban Area Plan (UAP) and the Rural Area Plan (RAP). These documents form the material considerations against which planning applications are considered. They are drawn using the Strategic Land Use Plan for the States; although once adopted, the policies and provisions of the plans are the key considerations in the decision making process. In the case of the proposed airport improvements, the RAP is the relevant document.

13.1.2 In pre-application consideration of the airport proposals with States of Guernsey Planning Department, it has been established that the amount of air traffic associated with the airport will remain unchanged as a result of the rehabilitation proposals. Accordingly the main focus with regard to the proposal will be upon the impact of build rather than the long term economic impact upon the island, which should be minimal. The major considerations in this instance will be the environmental impact that the development will have upon the area in and around the airport and also the impact of the construction process overall.

13.2 Recent Planning Changes

13.2.1 A new Planning and Development Law has been passed by the States and came into force, together with related Ordinances, on the 6th April 2009. The main legislative document is now The Land Planning and Development (Guernsey) Law, 2005 which sets out the purposes of the principal Law and its application.

13.2.2 The Law is accompanied by eleven Ordinances of the States which relate to various aspects of Planning and Building Control. The key documents in respect of the airport proposals are:

- The Land Planning and Development (Plans) Ordinance, 2007 which addresses the content of plans and local planning briefs and proposals for new, replacement or amended Plan or local planning brief; and

- The Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007 which contains advice in relation to EIA requirements in respect of Development Plans, Local Planning Briefs and Planning Applications. Schedules 1-6 of the Ordinance provide details of the types of development and matters to be addressed for development requiring an EIA.

13.3 Effect of Changes

13.3.1 Prior to the new Law coming into effect, planning legislation was encompassed within the preceding Island Development (Guernsey) Law, 1966 (as amended); with guidance on Environmental Impact Assessment and procedures contained within the States of Guernsey 'Environmental Impact Assessment – Code of Practice 2005'.

13.3.2 The effect of the changes has been to consolidate the procedures for EIA development and to place more emphasis on the appropriate assessment requirements when undertaking these. In addition, the procedures for assessing a proposal's compliance with the provisions of the Development Plan and the mechanism for dealing with 'departures' has also been consolidated. As such, it is essential that all development proposals, such as those for Guernsey Airport, are carefully considered against the provisions of the new legislation; to ensure that appropriate procedures are followed and to safeguard against inadequate assessment of the relevant environmental issues pertinent to the proposals.

13.4 Environmental Impact Assessment (EIA)

13.4.1 The Environmental Impact Assessment is an established method of assessing the local and wider ranging environmental effects of a development, based on recognised criteria. In accordance with the EIA Ordinance 2007, the proposed airport improvements are considered as 'Schedule 1' development and in preliminary discussion, the States of Guernsey Environment Department have confirmed that an EIA is necessary.

13.4.2 Annex 4 of the RAP outlines what is required as part of the EIA and sets a procedure which the study should follow. In accordance with the procedures of Annex 5 of the RAP, a formal request for a 'Scoping Opinion' will be made to the Environment Department, whereby details of the proposal will be submitted for consideration to determine which issues the EIA should address. An informal agreement with officers of the Environment Department at the pre-application meeting has established that the following key issues are considered necessary for inclusion within the EIA:

- **Archaeology & Historic Environment**
  A desk-top study and site investigation of relevant areas of likely archaeological interest through excavation of selected test-pits, with appropriate assessment and recording. To include assessment of any other identified features of cultural and built heritage significance.

- **Air Quality & Climate**
  Assessment is to focus on the impact of the construction period including generation and control of potential fugitive dust and motor vehicle emissions from associated traffic; reference also to be made to changes to aircraft movements and reconfigured road network. Consideration of combined environmental effects, with primary focus on the construction period; with reference to issues of sustainability and site waste management.

- **Ecology, Natural Resources & Landscape Character**
  Desk-top and Phase 1 study of habitats, flora and fauna with extended Phase 1 and Phase 2 assessments as necessary, to include suitable mitigation and management as required. Consideration of likely effects on hydrological, geological and agricultural resources and assessment of soils, construction and imported materials. Assessment of existing landscape character based on RAP categories with consideration of

potential direct and indirect impacts on areas of High Landscape Quality due to land take, emissions and noise; visual impact of level changes, road reconfiguration, associated equipment and airport lighting; to include assessment of agricultural land status and potential impact.

- **Lighting**
  Assessment of additional needs to facilitate work operations during the construction period and to include consideration of impact of airport operational lighting reconfiguration.

- **Noise**
  Desk-top assessment of noise and vibration effects associated with changes to aircraft movements, including ground taxiing movements, through air noise modelling. Consideration of traffic noise from road reconfiguration and impact from general construction works and associated activities/processes, particularly from night time and possible weekend working.

- **Socio-Economic & Health Impact**
  Focused assessment of impacts during construction period with particular consideration of construction logistics, labour resource, associated amenity requirements and local economic effects. Reference to any recreational value impact from resultant land-take. Reference to general health & safety issues during construction process, including local community impact; airport related operational safety; and any relevant contamination issues arising from the development.

- **Hydrology and Flood Risk**
  Consideration of limitations of water supply and potential threats of pollution; impacts of alterations to flow patterns and drainage mechanisms; potential benefits of drainage reconfiguration; flood risk impact and mitigation from surfaced area remediation and expansion; loss of groundwater recharge areas and risk of groundwater pollution.

- **Development Contingencies**
  Consideration of potential airport operational changes during construction period and allowances for construction process in respect of phasing, working hours and siting of associated processes.

- **Transport**
  Handling capacity of local road network, implications of additional traffic movements during and post construction; impact of road closures and network reconfiguration.

13.4.3 Appropriate assessments will be undertaken to address these environmental considerations; in consultation with the Environment Department and in accordance with the guidance of the States of Guernsey 'Environmental Impact Assessment – Code of Practice 2005'.

13.4.4 The final statement to be submitted should include the following:

- a description of the existing site and the surroundings of the proposed development;

- a detailed analysis of the likely effect of the development on all aspects detailed above;

- a detailed description of the measures that could be used to minimise the impact of the project;

- a non-technical summary of the above information that can be easily read and understood by the public.

13.4.5 The EIA will clearly show that the proposed development represents the 'best practicable environmental option'. It will also be accompanied by a Compliance Document showing how the proposal is to address all of the issues identified in the Environmental Statement.

13.5 **Additional Supporting Information**

13.5.1 In addition to the EIA, the planning application will be supported by the following documents:

- A Rural Planning & Design Statement; which is a site specific assessment that demonstrates how the site is being developed beneficially in terms of land use, form of development and the relationship with the surrounding landscape.

- A Planning Statement; which describes and evaluates the application in the context of the RAP policies, as well as providing an overview of the EIA and other supporting documents.

13.6 **Planning Policy**

13.6.1 The key policy relating to the proposed development is Policy RD1 of the RAP, which relates to 'Essential Development & Infrastructure' and states:

13.6.2 *"Proposals for developments that are clearly demonstrated to be essential to the public interest, health, safety or security of the community and which comply with the general Plan objectives [of conserving and enhancing the rural environment] may, exceptionally, be allowed where:*

a) there is no alternative site available that, in the opinion of the Department, is more suitable for the proposed development;

b) the chosen position for the development within the site will have the least possible visual impact on the surrounding landscape and would present the best practicable environmental option;

c) materials sympathetic to the surrounding landscape are utilised. The preference will be for materials that will assist in harmonising the development with its surroundings;

d) the development is of a very high design quality and accords with Policy RGEN6; and,

e) landscape design, as may be required by Policy RCE8, forms an integral part of the proposal."

13.6.3 It is asserted that the proposed airport improvements will accord with the provisions of Policy RD1 and all other relevant policies of the Plan; in that they will comply with the primary objectives of conserving and enhancing the environment. This will be clearly demonstrated through the submission of an appropriate Environmental Impact Assessment; which will allow the proposal to be considered through the established planning application process, in accordance with the provisions of 'The Land Planning and Development (Environmental Impact Assessment) Ordinance 2007'. In particular, it is considered that an EIA will be the most appropriate and effective means of assessing the proposals and the environmental benefits which they could provide.

13.7 **Procedural Requirements**

13.7.1 For major development proposals which signal a departure from the RAP, a Public Inquiry is required to consider all relevant issues so that the RAP may be amended to allow for such development, if approved. In accordance with The Land Planning and Development (Plans) Ordinance 2007, the Environment Department would give notice of its intention to lay before the States amendments to the RAP. This would then lead to the undertaking of a Strategic Environmental Assessment, holding of a Planning Inquiry and finally a formal planning application.

13.7.2 In this instance, it is asserted that the proposals are compliant with the relevant policies of the RAP and as such, a Public Inquiry is not necessary. Accordingly, it is considered that a planning application submission with Environmental Impact Assessment will be the most appropriate mechanism of determination for this development.

13.8 **Planning Summary**

13.8.1 It is asserted that the airport improvement proposals are essential to the public interest and are in compliance with the principles of conserving and enhancing the rural environment. Specifically, the following key considerations are made:

- there are no suitable alternative sites;
- the proposals will offer the least visual impact and the 'best practicable environmental option';
- the development will be carried out using sympathetic materials and high quality design;
- high quality landscaping will be integral to the scheme.

- there will be no encroachment outside of the confines of the existing airport boundaries;

- there is no encroachment in to the existing Area of High Landscape Quality;

- the proposals will facilitate other environmental benefits for existing water resources, visual amenity and local economy.

13.8.2 It is considered that the proposals are fully compliant with the primary objectives and aims of the RAP and as such, the established development policy for the Island. Accordingly, a formal amendment to the RAP is not necessary, which in turn negates the need for a Public Inquiry.

Appendix 2

Halcrow Group Limited

Guernsey Airport Pavements Rehabilitation
Peer Review of Runway Proposals
May 2009

Halcrow Group Limited

Halcrow Group Limited

Guernsey Airport Pavements Rehabilitation
Peer Review of Runway Proposals
May 2009

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Guernsey Airport Pavements Rehabilitation
Peer Review of Runway Proposals

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	Draft Report	30.04.09	N Kaberry
2	1	Draft Report	15.05.09	N Kaberry
3	2	Final Draft Report	22.05.09	N Kaberry
3	3	Final Report	09.06.09	N Kaberry

Contents

Executive Summary

Guernsey Airport and its consultant RPS Burks Green have formulated proposals for the rehabilitation of runway, taxiway and apron pavements at the Airport. The project includes extensive changes to the configuration of the runway, for which five possible schemes have been defined. This independent review by the Halcrow Group examined those five basic options plus a number of possible variants raised following presentation of the proposals to States Members in December 2008.

In summary, the purpose of the review was to consider the degree of compliance of the options with aerodrome licensing regulations. It was to consider whether any non-compliant aspects could or should be improved, and whether any elements might be amended to reduce costs while preserving a level of compliance likely to be acceptable to the regulatory authority.

In terms of runway re-configuration, the options and variants examined are set out below. The conclusions drawn from our review are set out in the paragraphs that follow.

Option A:	1463m runway.	Retaining the existing runway configuration.
Option B:	1463m runway.	As existing, but with the west RESA extended to 240m.
variant B2:	1700m runway.	Major extension east, and both RESAs extended to 240m.
Option C:	1463m runway.	Extended west, west RESA extended to 240m, east 198m.
variant C2:	1700m runway.	Major extension east and both RESAs extended to 240m.
Option D:	1385m runway.	Runway length reduced and both RESAs made 135m. Referred to as the 'Langlois' option.
variant D(i)	1385m runway.	As Option D, but starter extensions reduced in length.
Option E:	1463m runway.	Extended west and both RESAs made 202m.
variant E+:	1463m runway.	As Option E but with starter extension and Taxiway D relocation.
variant E2:	1700m runway.	Major extension east and both RESAs made 240m.

Runway Length
We understand that a strategic assessment of future air services and consequent runway requirements has been put in hand. We would not expect any such study to conclude with certainty about future requirements at the Airport. Services to Guernsey will always be subject to external events so there will always be some uncertainty as to what runway length the island might need in the future. Conversely, providing a longer runway would not guarantee that services will continue or expand.

The Design Report indicates that the need for runway extension in the foreseeable future is presently considered unlikely, and we are of the same view. It is a basic principle of good planning, however, that nothing should be done to critical infrastructure that would eliminate or unnecessarily limit future development choices. We have not assessed the 1700m runway variants, but we do believe that the option to extend the runway in the future should be preserved.

Runway Width
CAP 168 recommends that the pavement of a Code 3C runway, like that at Guernsey, should be 30m wide, whereas the existing runway is 45m wide plus shoulders totalling 23m. Savings in construction and future maintenance costs could be made by upgrading only to the compliant 30m. All the options propose that the 45m paved width be retained, but the shoulders deleted from the new construction.

Runway width affects safety in two main ways; the pilot's perception of position on approach, and the risk of running off the paved surface in adverse conditions such as a contaminated runway or crosswind. Strong crosswind conditions are relatively common at Guernsey. Pilots of the larger aircraft serving the Airport will be accustomed to using runways of 45m or greater width at major airports. These factors indicate that the additional margin of protection against a runway excursion provided by the current width would be worth preserving.

Runway Profile
All options include the re-profiling of the runway, which currently falls significantly short of required longitudinal gradient standards. This work constitutes the majority of the cost of the proposed scheme. Excessive longitudinal runway gradients may affect the ability of an aircraft to achieve expected landing and take-off performance. Abrupt changes of slope may de-stabilise the aircraft and undulations may reduce inter-visibility between aircraft on the manoeuvring area. The latter is a known problem at Guernsey.

The relationship between the quality of runway profile and incident risk is extremely complex and it would be very difficult to formulate a convincing safety case for other than a compliant profile. While it is recognised that the very high costs of regrading could be reduced by accepting a less-than-compliant profile, we do not believe such a course would be advisable. It is not practicable to quantify the safety benefits versus regrading costs, but we believe the balance of such a calculation would be in favour of compliance with standards. We would not, therefore, recommend any change in the proposals in this respect.

Taxiway D Runway Connection

It is proposed that Taxiway D be extended to give direct access to the start of Runway 09, to eliminate the need for backtracking on departure and to ensure full use of the available runway length. The elimination of backtracking offers some safety benefit and should improve runway capacity at peak times by reducing average departure runway occupancy time.

The benefits of the connection will be reduced, however, if departing aircraft have to hold at some distance from the runway entrance. This distance could be reduced by maintaining a 168m taxiway/runway separation as far west from Taxiway C as possible. This would allow the Cat 1 hold to be nearer the runway end, reducing the time interval between an arrival and the departure lining up. Such a layout would require more land and would put taxiing and holding aircraft closer to houses on the southern boundary.

The benefit of minimising departure runway occupancy time depends on how close the runway is to capacity at peak times and the mix of arrival and departure demand. More detailed study would be necessary to establish whether there would be sufficient capacity benefit to justify the additional cost and impact.

Taxiway D Gradient

A section of Taxiway D adjacent to the Aero Club considerably exceeds the recommended maximum gradient. It would be extremely costly and disruptive to render this section compliant and, consequently, the intention is to leave this section at its current profile.

This section of taxiway cannot be avoided by 09 departures or 27 arrivals other than by lengthy backtracking on the runway. Steep taxiway gradients require higher braking forces and thrust, with some risk of reduced directional control, particularly for large aircraft and in poor surface conditions. Given the low speeds involved, the likelihood of a serious incident arising from such a situation is low. We do not believe the cost and disruption entailed

in significant improvement here could be justified by the likely benefits.

Runway End Safety Areas
The main differences between the options and variants lie in the lengths of RESA they would provide, with some associated differences in runway length. Because the feasibility and costs of the runway enhancements are constrained by land area, topography and other factors, the question of how much RESA length is to be provided is central to evaluation of the proposals.

The purpose of a RESA is to protect an aircraft from damage and its occupants from injury if it runs beyond the end of the runway. RESA length has no effect on the probability of an overrun occurring, but does affect the likelihood of an overrun incident becoming an accident. The CAA recommends - and will insist wherever practicable - that RESAs be 240m long. Where this full distance, or very close to it, cannot be achieved, a convincing safety case must be made or the declared runway length reduced to accommodate it.

Numerical risk assessment indicates that only those options providing a RESA of 200m or longer at each end would be acceptable to the CAA and thus likely to find favour with the DCA.

The use of an arrestor system offers an alternative to provision of the full RESA length, with potential savings in land take and construction cost. Under current regulations any such savings in capital cost appear likely to be modest, as the length of level ground beyond the runway end would be similar to that required for a conventional RESA. The costs of maintaining an arrestor system, and the operational disruption and cost of reinstating it in the event of an overrun, must also be considered. In Guernsey's case there may be merit in raising the possible use of arrestors with the CAA but we cannot assess the likelihood of acceptance, the time this would take or what the final parameters of an acceptable installation might be.

Local Impacts
The options would have varying impacts in terms of land and property taken and changes in the exposure of residents to noise, visual intrusion and risk from aircraft accidents. As much of the land in question has already been acquired and the number of residents displaced would be very small, we do not believe this factor should be given great weight in option selection.

Based on a qualitative assessment, none of the changes in noise exposure or visual perception of aircraft operations arising from the

proposals appear likely to have a significant impact on people in the area.

With some of the options there would be changes in the exposure of people to the risk of death or injury in the event of an aircraft accident, due to changes in runway end or threshold location. Analysis of available third party risk data indicates that the impact of such changes on individual risk exposure would not be significant.

Assessment of the Options
Our assessment of the acceptability of the options in regulatory terms has focused on the lengths of RESA and runway provided, as these are the factors most directly affecting operational safety, capital cost and local impact.

There is some variation between the options in the risk of an overrun occurring, due to the differences in landing or take-off distances provided, but the level of risk would be acceptable in all cases. There is much greater variation between options in the risk of an overrun becoming a serious incident, due to the differences in RESA length. The following assessments are based primarily on the analysis of serious overrun risk, together with experience of the CAA's attitude to this particular aspect of risk mitigation.

Option A: We do not believe it would be acceptable to the CAA to carry out the extensive changes proposed to the runway without, at the same time, achieving improvement in the RESA situation. The fact that other options considered here show that RESA improvements are feasible and affordable can only reinforce this view.

Option B: This option improves the west RESA to the recommended distance of 240m but leaves the Runway 09 RESA unchanged at 90m. As all operations must be afforded a similar and tolerable level of serious overrun risk, we do not believe this scheme would be acceptable.

Option C: This option provides a west RESA at the full 240m and an increase in east RESA length to 198m. It also gives an increase in the effective length of Runway 27 of 120m. Consequently, this option provides a much-improved level of serious overrun risk and we believe it would be acceptable to the CAA.

Option D: The main effect of both variants of Option D from a safety standpoint is the provision of 135m RESAs at each runway end. There is thus a 45m increase in east RESA length over existing while the west RESA is increased by 25m. While this would improve serious overrun risk in both directions, and have the

advantage of minimising local impacts and cost, but we do not believe the gains are sufficient to find favour with the CAA, given also that they come at some cost in landing distance.

Option E: This option is essentially similar to Option C, providing much the same runway distances but with the RESAs balanced at 202m each end. This reduces the impacts and extent of works required at the west end. This option provides a much-improved level of serious overrun risk and we believe it would be acceptable to the CAA. Option E+ adds a 125m starter extension to Runway 09.

Options C, E and E+ offer similar degrees of reduction in serious overrun risk and would bring the overall risk level close to that expected with full-length RESAs. Within the precision of the assessment method, the overall risk values for these options are essentially the same. We understand that Option E has been presented to the CAA and is considered by them to be a reasonable and acceptable scheme, indicating no objection in principle to 202m RESAs. Given that Option C provides a full-length RESA on the most-used runway and very close to 200m on the other heading, we believe it should be similarly acceptable to the CAA and may be preferred.

1 Introduction

1.1 ***Terms of Reference***

1.1.1 Guernsey Airport and its consultant RPS Burks Green (RPS BG) have formulated proposals for the rehabilitation of runway, taxiway and apron pavements at the Airport. In addition to pavement reconstruction, overlaying and other improvements, the project includes extensive changes to the configuration of the runway. A set of proposals comprising a 'baseline' scheme was presented to States Members in December 2008. States Members were then invited by the Public Services Department to offer alternatives that they considered were worthy of further consideration. Five runway options were then taken forward for evaluation by the Department.

1.1.2 Following discussion and comment, including the suggestion by Members of further variants, Guernsey Airport considered that the process of identifying the optimum runway solution would benefit from an independent review of the options. The Halcrow Group was engaged to undertake that review, under the Terms of Reference given in Appendix A.

1.1.3 The information on which our review is based was gathered at a meeting on 24th March 2009 with the Airport Director and the Operational Director of RPS BG, and from option drawings issued to us by RPS BG on 3rd April 2009. The Design Report referred to in the text is that presented to States Members in Billet D'Etat XVIII December 2008and was accessed via the Guernsey Government website.

1.1.4 In summary, the requirements of the commission are to:

- review the compliance of the five runway options and their sub-options with CAP 168 Licensing of Aerodromes
- indicate where design is non-compliant or where the design might be relaxed
- advise on the minimum acceptable lengths of Runway End Safety Areas
- comment on the possible use of arrestor beds.

1.1.5 The options and sub-options reviewed are summarised in the following table. Option E+ is the original baseline scheme presented in December 2008. The evolution of these options and variants is explained and considered in more detail in Section 8.

Option	Basic length	Main features
A	1463	Existing runway configuration
B	1463	Existing, but west RESA extended to 240m
B2	1700	Extended eastwards, both RESAs 240m
C	1463	Extended west, west RESA 240m, east 198m
C2	1700	Extended east, both RESAs 240m
D (Langlois)	1385	Runway reduced, both RESAs 135m
D (i)	1385	As D (Langlois) but starter extensions reduced
E	1463	Extended west, both RESAs 202m
E+	1463	As E but starter extension and T/W D relocation
E2	1700	Extended east, both RESAs 240m

1.2 ***Airport Regulation***

1.2.1 It is understood that aerodrome licensing and regulation of Guernsey's operations now rests with the DCA, who will generally seek the advice of the UK CAA on technical issues and matters requiring interpretation of aeronautical standards and recommendations. We have based our review of the proposals on the CAA's CAP 168, with reference to Annex 14 and other ICAO documents where these provide relevant additional information.

1.2.2 We have further assumed that, where interpretation of the regulations is required or where an element of judgment is necessary, the CAA's advice would be the basis for acceptance or approval of any proposal, and that the Authority would view Guernsey exactly as it would a UK aerodrome under its jurisdiction.

1.2.3 CAP 168 states - and our previous experience in dealing with CAA Aerodrome Standards reflects - that when considering proposals affecting an aerodrome licence it will take a flexible approach consistent with the achievement and maintenance of a satisfactory level of safety. The Authority recognises that some airports have to work within severe physical constraints and all have to take account of the cost of aerodrome works and the effects of development and operations on their neighbours. While this means there is often room for interpretation of regulatory requirements, an acceptable level of safety must always be demonstrated and cost or local impact alone will not be acceptable reasons for not doing so.

1.2.4 In carrying out this review we have applied our independent judgment as to what we believe is a satisfactory level of safety and what proposals would be likely to be accepted by the CAA. This should not be taken as a guarantee that the Authority would agree with our view or approve or reject any specific proposal.

1.3 ***Halcrow Group***

1.3.1 The Halcrow Group is an independent provider of infrastructure-based business solutions. Halcrow has no connection with airport operators, airlines, contractors or other agencies, except as an independent professional consultant.

1.3.2 Halcrow's Air Transport group has previously undertaken commissions for Guernsey Airport, including pavement evaluation, airside planning and market survey. Our 2001 Runway Extension Study[1] included a quantified overrun risk assessment for an extended runway with sub-optimal RESAs, the methodology of which was approved by CAA Aerodrome Standards. The methods used in that study and our experience then and since of dealing with the CAA on risk issues have been drawn on in the present evaluation.

1.4 ***Report Content***

1.4.1 In order to put the evaluation in the correct context of the market the Airport serves and the regulatory regime within which it operates, Section 2 first considers runway length requirements. Sections 3, 4 and 5 respectively consider the necessary degree of compliance relating to runway width, the vertical profiles of the runway and runway strip, and the treatment of Taxiway D. The regulations regarding RESAs, their function and relation to accident risk are reviewed in Section 6. Section 7 looks briefly at how the proposals might impact on local environmental sensitivities. Section 8 then reviews the overrun risks associated with the options and considers their acceptability to the regulator.

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1 States of Guernsey, Guernsey Airport Runway Extension Study, Extension Planning & Risk Assessment, Final Report, October 2001, Halcrow Group Limited, London.

2 Runway Length

2.1 ***Introduction***

2.1.1 Consideration of runway length is important in evaluation of the options. Some options may more readily accommodate future extension than others, so the question of whether a longer runway might ultimately be needed must be taken into account. More RESA length can be created by shortening a runway, but the effect of that on the usability of the runway by some aircraft must be considered. The following sections seek to clarify what the various runway distances mean in practice.

2.2 ***Critical Distances***

2.2.1 For landing, a pilot needs only to know how the landing distance available (LDA) compares to the distance his aircraft requires, given its weight and the weather and surface conditions, to land and decelerate to a safe speed. Before take-off, however, the pilot of a multi-engine commercial transport must consider the possibility of an engine failure, so both the take-off distance available (TODA) and the accelerate stop distance (ASDA) must be accounted for.

2.2.2 If an engine fails before the aircraft reaches a critical speed in its take-off run, he must abort the take-off and bring the aircraft to a stop. This is because at less than the critical speed the aircraft is not moving fast enough to ensure a safe transition to flight under reduced power. If the engine failure occurs above the critical speed the take-off must be continued, because the aircraft will be travelling too quickly to stop within the pavement length available. In this case there must be enough pavement length remaining to continue accelerating the aircraft to lift-off speed and climb clear of any obstacles at the runway end.

2.2.3 In the majority of cases, a critical speed is selected such that the TOD required and the ASD required are equal. Consequently, it is the lesser of the two available distances, TODA or ASDA, which determines whether an aircraft can operate safely. There is no operational benefit in extending a runway to provide additional TODA, for example, if this is not balanced by ASDA, and vice versa.

2.3 ***Existing Runway***

2.3.1 The declared distances and RESA lengths (in metres) for the existing Guernsey runways are as follows[2]:

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2 Data supplied by the Airport 14.05.09. Differs from AIP information following recent re-survey.

Runway	TORA	TODA	ASDA	LDA	RESA
09	1463	1601	1463	1458	90
27	1462	1639	1462	1458	110

2.3.2 These distances categorise the runway as Aerodrome Reference Code 3 (not exceeding 1800m aerodrome reference field length) under the International Civil Aviation Organisation (ICAO) runway classification system. The runway slopes generally downwards from east to west, with an overall gradient of 0.65%, although there are sections with local gradients well in excess of this.

2.3.3 The table shows that, for take-off on either heading, ASDA is the critical distance, as it is substantially less than TODA in both cases, which is not uncommon. Achievable TODA is generally determined by topography and local obstacles. ASDA may also be constrained by aerodrome topography but is not affected by obstacles; it can often be increased by the use of a starter extension at the beginning of the take-off run.

2.3.4 Any runway gradient will affect the runway distances actually required by an aircraft on take-off or landing. An upslope reduces acceleration to take-off speed while a downslope allows an aircraft to reach take-of speed in a shorter distance. On landing, an upslope reduces stopping distance required, while a downslope increases it. As noted in the Design Report, the slope at Guernsey could make a difference in the order of 100m to the take-off or landing distance required on either runway heading.

2.4 ***Runway Length Required***

2.4.1 It is understood that a strategic assessment of future air services and consequent runway requirements has been put in hand, but no results of this were available in the timeframe of the present review. We would not, however, expect any such study to conclude with absolute certainty about future requirements at the Airport. Services to Guernsey will always be subject to the effects of changes in airlines' strategies in response to external events, such as changes of aircraft type and routes offered. So there will always be some uncertainty as to what runway length the island might need in the future. Conversely, providing a longer runway would not guarantee that services will continue or expand.

2.4.2 The Design Report indicates that the need for runway extension in the foreseeable future is presently considered unlikely. We understand that FlyBe has indicated that a planned change from DHC8 to Embraer 195 aircraft would not require a longer runway to

support the services it intends to operate. It is a basic principle of good planning, however, that nothing should be done to critical infrastructure that would eliminate or unnecessarily limit future development choices. We therefore believe that the option to extend the runway in the future should be preserved, provided that this does not detract from the effectiveness of the immediate solution and that the cost of doing so is acceptable.

3 Runway Width

3.1 ***Introduction***

3.1.1 CAP 168 recommends that the pavement of a Code 3C runway, like that at Guernsey, should be 30m wide. The existing runway is 45m wide and also has shoulders totalling 23m. It could thus be argued that considerable savings in construction and future maintenance costs could be made by upgrading only a 30m width, while remaining compliant.

3.2 ***Proposals***

3.2.1 For all the options it is proposed that the 45m paved width would be retained, but the shoulders would be deleted from the new construction. Research mentioned in the Design Report (6.67) indicates that the runway was widened to its present dimension "due to experience with strong cross winds".

3.2.2 Runway width affects safety in two main ways; pilot perception of position on approach, and the margin for deviation from centreline on landing. During a visual approach, the pilot judges his height and distance from threshold partly by the picture presented by the shape of the runway pavement in his field of view. A runway that is substantially wider than 'normal' can distort the pilot's perception of his height and distance from threshold, leading to inaccurate touchdown. With a high crosswind component deviation from centreline may occur during the transition from flight to ground contact or during the roll-out, particularly if winds are gusting or surface conditions poor. High longitudinal runway gradients and changes of gradient can exacerbate this. Runway width provides space to recover from deviations in such cases.

3.2.3 Strong crosswind conditions are relatively common at Guernsey, as evidenced by the summarised wind data for 2008 included at Appendix B. As an indication, some aircraft types are approaching their operational limit at a crosswind component in excess of 20kt.

3.2.4 All landings at Guernsey will be made with reference either to the ILS or, in visual conditions, to PAPI. Visual perception of runway shape should not be a significant factor, therefore, given also that pilots of the larger aircraft will be accustomed to using runways of 45m or greater width at major airports. When considered together with the incidence of crosswind operations at Guernsey, this factor indicates that the additional margin of protection against a runway excursion provided by the current width would be worth preserving.

4 Runway and Strip Profiles

4.1 ***Introduction***

4.1.1 All options include the re-profiling of the runway and runway strip. This work constitutes the majority of the cost of the proposed scheme, requiring as it does very large volumes of pavement material and earthworks executed in stages to minimise runway closure. Relaxation of standards in these areas would, therefore, offer considerable cost savings.

4.2 ***Runway Profile***

4.2.1 If they are excessive, longitudinal runway gradients could be the cause of an incident or might contribute to the consequences of an incident arising from other causes. They may affect the ability of an aircraft to achieve expected landing and take-off performance. During landing, down-slopes can lead to 'floating' and consequently landing long, while up-slopes may contribute to hard landings. Abrupt changes of slope may de-stabilise the aircraft, making fine control more difficult at critical points. Undulations may also lead to reduced inter-visibility between aircraft on the manoeuvring area. We understand, for example, that the pilot of a small aircraft touching down on a Runway 27 approach would not be able to see the runway junction with Taxiway D.

4.2.2 The relationship between the quality of runway profile and incident risk is, given the number of parameters involved, extremely complex and is not amenable to any ready form of analysis. It would therefore be very difficult to formulate a convincing safety case for other than a compliant profile. Any significantly non-compliant proposal would therefore have to be justified to the regulator solely on cost grounds.

4.2.3 The proposals would render the runway compliant with the gradient criteria laid down in the ICAO regulations, which are slightly less onerous in certain respects than those of CAP 168. We do not believe, however, that this would require a safety case to be made or be seen as detracting significantly from the safety objectives of the latter document. While it is recognised that the very high costs of the proposed regrading could be reduced by accepting a less-than-compliant profile, we do not believe such a course would be advisable. It is not practicable to quantify the safety benefits versus regrading costs, but we believe the balance of such a calculation would be in favour of compliance with standards. We would not, therefore, recommend any change in the proposals in this respect.

4.3 ***Grading of the Strip***

4.3.1 The shape of the ground in the runway strip is a secondary safety issue, in that it only becomes a factor in the safety of an aircraft once it has left the paved runway due to other causes. Maximum gradients and changes of gradient are specified with the aim of protecting the aircraft from high dynamic forces that could disrupt the undercarriage or airframe, and to maximise the likelihood of it coming to a stop before meeting uncontrolled obstacles.

4.3.2 In this respect, smoothness of gradient changes along and across the strip, combined with bearing strength and effective de-lethalisation of hard points may be considered more beneficial than strict adherence to specified grades. While full compliance should be the objective, the designers may wish to consider whether there are any areas where existing grading is more benign than the regulations require and which might thus yield material that would reduce the need to import fill.

5 Taxiway D

5.1 ***Introduction***

5.1.1 It is proposed that Taxiway D be extended to provide direct access to the start of Runway 09. We understand that the aim of this is to eliminate the need for backtracking on departure, which would be required if D was left in its current position, and to ensure full use of the available runway length.

5.2 ***Runway Connection***

5.2.1 The elimination of backtracking offers some safety benefit and should reduce average departure runway occupancy time. The use of a turning head would be likely to extend occupancy time due to the need for low-speed manoeuvring.

5.2.2 The capacity benefits of the direct connection may be reduced, however, if aircraft have to hold at some distance from the runway entrance. It is understood that the VMC stop bar on the re-routed D would be at about 100m from the runway entrance but, because of the reduced taxiway separation in its western section, the Cat 1 hold would have to be back at the Taxiway C junction, at least 500m from the runway entry point.

5.2.3 This distance could be reduced by maintaining a 168m Taxiway D/runway separation as far west from C as possible. This would allow the Cat 1 hold to be nearer the runway end, reducing the time interval between an arrival passing the threshold and the departure lining up. Such a layout would, however, require more land for the taxiway strip and would put taxiing and holding aircraft closer to houses on the southern boundary.

5.2.4 The benefit of minimising departure runway occupancy time, by reducing the hold to entry distance, depends on how close the runway is to capacity at peak times and the mix of arrival and departure demand. More detailed study would be necessary to establish whether there would be sufficient benefit in reducing taxi time to justify the additional cost and impact.

5.3 ***Taxiway Gradient***

5.3.1 A section of Taxiway D adjacent to the Aero Club considerably exceeds the recommended maximum gradient for Code C operations, but meets the Code B requirement (Design Report 7.12). It is understood that it would be extremely costly and disruptive to render this section Code C compliant and that, consequently, the intention is to leave this section at its current profile.

5.3.2 This section of taxiway cannot be avoided by 09 departures or 27 arrivals other than by lengthy backtracking on the runway. The absence of a turning head at the west end would make that manoeuvre more difficult and slow, almost certainly affecting runway capacity at peak times.

5.3.3 Steep taxiway gradients require higher braking forces and thrust, with some risk of reduced directional control, particularly for large aircraft and in slippery conditions. Given the low speeds involved, the likelihood of a serious incident arising from such a situation is low. We are not aware of any past difficulties or incidents as a result of the Taxiway D profile but, if its use is practically unavoidable, operational measures might be taken to avoid aircraft stopping on this section and to alert pilots to its characteristics via the AIP.

6 Runway End Safety Areas

6.1 ***Introduction***

6.1.1 Because feasible runway configurations at the Airport are constrained by land area, topography and other factors, the question of how much RESA length can or should be provided is central to evaluation of the proposals. This section considers why RESAs are a regulatory requirement and what factors affect the acceptability or otherwise of any proposed RESA provision.

6.2 ***Regulation***

6.2.1 The RPS BG Design Report (Section 6) quotes at length from CAP 168 on the subject of RESAs and it is worth repeating some of that material here. The CAP states;

"RESAs are intended to minimise risks to aircraft and their occupants when an aeroplane overruns or undershoots a runway."

"The length of RESA needed for a specific runway will depend on a number of variables, such as the type and level of aircraft activity, and local conditions. The minimum requirement is 90 m for all code 3 and 4 runways, and code 1 and 2 instrument runways. The RESA width should be that of the associated cleared and graded area, with a minimum of twice runway width, symmetrically disposed about the extended centreline of the runway."

"Licence holders should not assume that the minimum distance of RESA will necessarily be sufficient, particularly where there have been changes to the environment on or around the aerodrome, or to the type or level of traffic; it is recommended that RESAs extend to at least 240 m for code 3 and.....runways, wherever practicable and reasonable."

"If a RESA beyond the 90 m minimum is deemed necessary but there are physical constraints to achieving the desired distance, Declared Distances should be reduced unless other mitigation measures can be demonstrated to achieve an equivalent safety result for the same set of operational circumstances."

The document then gives a list of mitigating physical and operational measures as possible alternatives to reducing declared distances. It is assumed here that those measures within the influence of Guernsey Airport have been or will be put in place.

6.2.2 It remains necessary to justify any proposal that would not provide the recommended 240m RESA length. That justification cannot simply state why it is not feasible or affordable to provide the full length; it must demonstrate to the CAA's satisfaction that the runway configuration would provide an acceptable level of protection to an aircraft in the event of an overrun.

6.2.3 All the options considered provide RESAs that are 90m wide. This meets the minimum width requirement stated in the CAP, but not the recommended figure equal to the cleared and graded strip; 210m. This is because of the constraints imposed by land availability, the locations of roads and properties fill quantities and cost. Not all aircraft that overrun a runway do so along the extended centreline, but diverge more or less to one side. Clearly, a wider RESA offers a better chance of protecting an aircraft from damage, so the RESA proposals considered here are all less than optimal in terms of width. Because pilots of overrunning aircraft may still have some directional control, limited width amplifies the importance of adequate RESA length in providing acceptable levels of overrun risk.

6.3 ***Function and Risk***

6.3.1 The purpose of a RESA is to protect from damage any aircraft that runs beyond the end of the declared runway, on landing or following an abandoned take-off. It is an area free of obstacles and abrupt changes of level and with a sufficiently hard surface to prevent significant damage to an aircraft running into it. The degree of potential damage can, of course, vary; collision with small or frangible objects such as lights or antennae may result in only minor airframe damage, whereas running over a drop-off or into banks or walls is likely to cause abrupt deceleration and airframe break-up.

6.3.2 The presence or dimensions of a RESA have no effect on the likelihood of an aircraft overrunning. The dimensions of the RESA, the shape of the ground and the nature of any objects in it will have effects only on the outcome of an overrun that has already occurred; that is, the degree of damage suffered by the aircraft and its occupants. The exception to this is if runway length is sacrificed to allow a longer RESA to be accommodated, in which case the shorter runway may actually increase the likelihood of overrun occurring.

6.3.3 All risk assessments have three elements; identification of the hazard, estimation of the likelihood of occurrence, and assessment of the likely severity of the outcome. The acceptability of a risk is determined by the combination of likelihood and severity of outcome.

6.3.4 Many factors contribute to the likelihood of an overrun, some of which are under the influence of the airport operator but many of which are not. It is assumed here that those elements over which Guernsey Airport has control, such as runway surface condition, weather reporting etc. have been addressed. It is impractical to quantify the effect of the numerous other, external factors in overrun probability, such as pilot error, mechanical failure, adverse weather etc. Risk assessment is therefore usually based on historical accident statistics which, by definition, encompass all the factors that may contribute to overrun incidents.

6.3.5 The statistical rate of overruns varies between aircraft types and between different types of air operation. The overall risk of an overrun at an airport therefore depends on the mix of aircraft types operating there. Jet aircraft operating public transport services have the lowest likelihood of overrun. Modern turboprop airliners exhibit approximately twice the overrun risk of the jets, and older-technology turboprops (e.g. HS748, Shorts 360) a yet higher risk. Piston engine commuter aircraft types and the smaller singles and twins mostly used for recreational and training flying have the highest overrun risk.

6.3.6 Overrun risk assessment at any given airport using these statistically-based factors must be done with caution, however. Many of the overruns in the database will have occurred on runways very different from the one being analysed and in widely varying operating conditions. It is prudent, therefore, to regard such risk assessment more as a means of comparing runway development options than of calculating absolute risks.

6.3.7 The consequences of an overrun, once it has occurred, depend on how large and clear an area can be provided beyond the runway end. CAP 168 specifies minimum standards of ground profile, obstacle removal etc. for an area to be counted as RESA. Assuming these criteria are met, the only factor affecting the likely outcome of an overrun for the aircraft and its passengers is the length of RESA provided. The longer the RESA, the greater the chance of the aircraft coming to rest before it encounters the kind of potentially damaging features commonly to be found beyond a runway end; fences, trees, roads, watercourses and abrupt changes of level.

6.3.8 CAP 168 Chapter 3, 5.1 states that RESAs are provided to protect an aircraft in the event of an overrun or an undershoot. Historical crash data[3] indicates that as many as 36% of crashes in the vicinity of airports occur short of the runway, rather than on (24%) or beyond it (40%). Many of these, however, will have occurred at a considerable distance from the runway and thus would not be relevant to RESA planning. Methods advanced by the CAA for assessing RESA requirements[4] focus on overrun risk, probably because a causal relationship between undershoots and runway characteristics would be difficult to establish, and the potential contribution of a RESA to

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3 For example, the Airclaims CASE database quoted in DETR (1997) Third Party Risk Near Airports and Public Safety Zone Policy, A Report to the Department by Consultants, National Air Traffic Services Limited for the Department of the Environment, Transport and The Regions, London, June 1997.

4 Runway End Safety Area Provision, a CAA Paper, working draft, Version 1.6, CAA 12.05.97, superseded by Risks from Aeroplanes Overrunning Aerodrome Runways, Edition One, CAA October 1998.

survivability in an undershoot less evident. Notwithstanding this, the larger the RESA, the greater its benefits are likely to be in an undershoot incident, just as in an overrun.

6.4 ***Previous Risk Assessments***

6.4.1 A previous study by Halcrow (see footnote 1) included a numerical overrun risk assessment of Guernsey's existing runway and an extended runway with RESAs of 230m and 210m on headings 09 and 27 respectively. This demonstrated that the existing 90m and 120m RESAs did not provide adequate mitigation of the risk of a serious overrun (i.e. one resulting in significant damage to the aircraft). It further showed that 210m and 230m RESAs would provide acceptable risk mitigation, against tolerability criteria quoted by the CAA.

6.4.2 That analysis and its results were accepted by the CAA as demonstrating the adequacy of the then proposed RESAs. A similar analysis can be done for the current options, taking into account differences in the anticipated aircraft mix. We have carried out such an analysis, as an aid to comparing the options; the results are discussed at the beginning of Section 8.

6.5 ***Arrestor Beds***

6.5.1 Arrestor beds are a means of bringing an overrunning aircraft to a halt with minimum damage within a short distance. Their commonest use is in situations where there is limited land available beyond the runway end before reaching features that would cause serious damage to an aircraft or generate ground casualties, such as an abrupt drop-off, river, road or occupied property. Arrestors are in place at over twenty US locations but they have seen little use in the UK.

6.5.2 The use of arrestors was first contemplated seriously in the UK following overrun incidents at Southampton in 1993 and Northolt in 1996. In both cases a corporate jet aircraft overran the runway and the airfield perimeter and came to rest on a major public road. The aircraft was destroyed in both cases, and at Northolt there were serious injuries to aircraft occupants and persons on the ground. Subsequently, so-called 'soft ground' arrestors were installed at Southampton and Northolt, the efficacy of which, to our knowledge, has yet to be tested by an actual overrun. Soft ground arrestors are basically shallow pits filled with a selected aggregate material, which retards an aircraft through mechanical displacement and drag.

6.5.3 Currently, CAP 168 (Chapter 3, 5.7) notes that risks may arise following an aircraft incursion into a soft ground arrestor and that they should not to be used to replace the minimum 90m RESA length requirement, i.e. they must be located at least 150m from the runway end.

6.5.4 Some uncertainty is inherent in the design of soft ground arrestors to effectively cover the potentially wide range of types and speeds of overrunning aircraft while minimising the forces exerted on airframe and passengers. There may be further concerns about access through beds for fire and rescue appliances and the consequences of fuel spillage and fire within the bed material, and regarding long-term maintenance to preserve the properties of the fill material. Given the island location there may also be concerns over the availability of suitable lifting equipment to extract an aircraft from soft ground arrestor material. The time taken to ship such equipment could render the Airport unserviceable for some time, although a badly damaged aircraft in or beyond a conventional RESA could pose similar difficulties.

6.5.5 These uncertainties led, in the US, to development of an alternative arrestor type, known as the Engineered Material Arresting System (EMAS). This uses a lightweight foamed concrete material as the retarding medium, the properties of which are much easier to predict and engineer to match likely aircraft dimensions, weight and speed. The arrestor is formed of blocks of material built up above runway level, with a lead-in ramp between the runway end and the arrestor material. At a large airport, an EMAS would allow the usual 1000ft (300m) safety area beyond the runway end to be replaced with a 600ft (180m) long EMAS. The width of an EMAS typically equals runway width, so it will only be effective in overruns straight off the runway end. The efficacy of EMAS has been demonstrated in the US by full-scale aircraft overrun tests.

6.5.6 Critically, in the Guernsey case, an EMAS must be constructed on flat ground at runway end level. This would require higher embankments overall than with normal RESAs although, if FAA regulations were followed, the EMAS could be limited to runway width. The length of EMAS bed required would depend on calculation for the aircraft types anticipated at the Airport.

6.5.7 In the event of an overrun into an EMAS, some or all of the material must be replaced. While this is being done the runway will not offer the required overrun protection and declared distances may have to be reduced. As with aggregate beds, there appear to be some concerns over access for firefighting and passenger evacuation over the EMAS material. Initial, maintenance and replacement costs are also likely to be relatively high. Although we have no cost data, it is clear that, metre for metre, the cost of an EMAS would be largely additional to the cost of preparing a conventional RESA platform. Cost saving might accrue, however, if the overall length and/or width of prepared platform could be reduced by use of an EMAS.

6.5.8 As far as we are aware, no tests have been made on EMAS in an undershoot scenario. Given the likely higher aircraft speeds and the

uncertainty of impact point, the benefits of an arrestor in such a case, like those of a RESA, must be limited. An EMAS might offer some advantage in terms of energy absorption, as in the overrun case, but marginal undershoot scenarios might be envisaged where aircraft damage could be greater with an EMAS in place.

6.5.9 Given the demonstrably high cost of providing full-length conventional RESAs at Guernsey, there may be merit in raising the possible use of EMAS with the CAA. We think it likely, however, that considerable research on the Authority's part and a revision of CAP 168 would be required to make the use of EMAS acceptable. This would introduce delay and there can be no certainty as to any outcome in terms of the required length, width or other parameters of such an installation.

6.6 ***ILS Localiser Obstacle***

6.6.1 The Airport has an ILS system on both runway headings, requiring an ILS localizer antenna to be installed at the outer end of each RESA. It is understood that investigation by RPS BG and the equipment manufacturer into positioning criteria for these antennae is ongoing. During the previous study by Halcrow, initial investigation indicated that the shape of the ground between the antenna and the runway is not critical, provided the antenna is set at least at runway threshold level.

6.6.2 This means either that the ends of the embankments formed at the runway ends to provide the RESA would have to be set at sufficient height to support the localizer antenna, or the antenna would have to be mounted on some form of bank or gantry above the general ground level. In either case, the end of the RESA would be marked by a significant hazard to any overrunning aircraft. This would be either an abrupt drop-off in ground profile or a substantial antenna support structure.

6.6.3 It is therefore apparent that any overrun that exceeds the available RESA would encounter a hazard, such as a drop-off, structure, road or wall, likely to cause serious airframe damage and occupant injury. The RESA length provided will therefore be the primary factor determining the outcome of any overrun incident.

6.6.4 On the matter of possibly upgrading the ILS systems to a higher category than the current Cat I, we agree with the assessment by RPS BG (as set out in Section 10 of the Design Report). On the basis of the available data, the cost of system upgrading, and the associated airfield works required as a result, would not be justified by the likely increase in usability of the Airport.

7 Impacts

7.1 ***Introduction***

7.1.1 The various options would have differing effects on the locality, in terms of land take, buildings affected, roads severed, and their noise and visual impact. There would also be wider-ranging impacts due to the import and transport of materials required for runway extension and regrading works. The following is a brief overview of the potential impacts.

7.2 ***Land, Buildings and Roads***

7.2.1 All options but two require acquisition of land currently outside the Airport boundary at one runway end or both, the extent of which depends on the length of RESA provided. The land area required is increased by the necessary height of embankments and achievable side slopes. As the necessary land is available for acquisition, albeit at substantial cost, land take cannot reasonably be seen as a significant differentiator between options.

7.2.2 Some options would require removal of residential and other buildings to accommodate RESAs. The elimination of residential property is a serious impact which must be justifiable on the basis of safety or significant operational benefit. A precedent has, however, been set by the relocation of properties on the north Airport boundary for safety reasons, so the CAA would be unlikely to view this as substantive obstacle to runway safety improvement.

7.2.3 La Mare Road would be severed in all but two options. Extended runway options would also sever La Villiaze Road and, in one case, Route des Blicqs. The network of local roads is such that traffic using these roads can readily be diverted, although it is recognised that this might require further land take and works to improve alternative links. Again, a need for road closure is not likely to be seen as a substantive obstacle to runway improvement in order to effect safety benefits.

7.3 ***Noise***

7.3.1 The various options would affect the aircraft noise impinging on nearby properties, depending on the proposed locations of landing thresholds and start of take-off roll positions. We are not aware of any quantified noise exposure studies for this scheme, but can make a broad assessment of noise effects. Properties alongside the runway and the final approach and initial climb-out tracks appear unlikely to perceive large changes in noise exposure. Properties close to or beneath these tracks would be more likely to perceive differences in

noise with options that affect the height of aircraft landing or departing overhead.

7.3.2 The maximum change in height over any point beneath an approach would be in the order of 6 to 7m lower than currently for the non-extended options, with one of the extended options resulting in a height reduction of about 12m. At properties close in to the runway these changes would probably result in some perceptible change in noise.

7.3.3 Those options that move the start of take-off run outwards, towards properties to the west and east of the Airport, would potentially increase the noise perceived there as aircraft turn into position and run up their engines prior to take-off. A shift of the start of roll position potentially also affects height over any given point during climb-out, and hence the noise perceived at ground level. Effects are difficult to quantify as the distribution of engine noise differs widely with aircraft type, take-off weight, wind direction etc. In all cases, some properties would experience more noise and some less.

7.4 ***Public Safety***

7.4.1 The exposure of third parties on the ground to risk from aircraft crashes is largely a function of their proximity to the runway extended centreline and to the threshold/end. In UK practice, Public Safety Zone (PSZ) risk contours are used to indicate the level of such risk at any location and as a basis for development control. We have had sight of PSZ maps produced for Guernsey based on 2007 traffic[5], which provide an indication of the number and location of properties exposed to risk. In the UK, development within the PSZ contours (denoting an annual individual fatality risk of 1×10^{-5} for someone constantly present) would be constrained, to prevent significant population growth. Within the 10^{-4} contour no resident or working population would be allowed. Users of roads passing through these areas are also exposed to risk, but their exposure is very much lower than the contour values because their presence is transient.

7.4.2 The relationship between risk contour location and runway configuration is complex but, in broad terms, moving the threshold/end positions would move the risk contours at that end in the same direction, almost in proportion to the amount of shift. The maximum shifts in the options reviewed are in the order of 120m outwards, which would be likely to bring a number of additional properties within the PSZ. It does not appear that such shifts would bring more property into the higher risk 10^{-4} contours.

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5 RPS BG drawings; SK1070 Existing Public Safety Zones Western End and SK1071 Existing Public Safety Zones Eastern End.

7.4.3 The PSZ and 10^{-4} contours define risk values necessary for development control purposes, but the variation of risk is in fact a continuum, reducing progressively with distance from the runway. At any given location, the actual change in a person's risk exposure as a result of the proposed runway re-configuration would be very small. Based on our experience in assessing the impact of airport development on third party risks we do not consider these potential changes significant in any of the options and do not believe they should be of concern to those who live and work around the Airport.

7.5 ***Visual Impact***

7.5.1 Options that move the start of take-off run locations substantially would alter the way in which aircraft can be seen from the surrounding areas. The effect would vary widely with location and, while those properties closest to the runway ends would be likely to notice the greatest change, it is not possible to quantify at this level of review. On the available evidence we would not consider visual impact to be a major differentiator of the options.

8 The Options

8.1 ***Introduction***

8.1.1 We have reviewed ten options and sub options, which are assessed in more detail below. In each case we first consider runway end safety before taking into account other effects such as cost or impact. We have not reviewed the 1700m options in any detail (see 2.4) but have considered the ease with which initial development could facilitate further extension. We first discuss the findings of our overrun risk assessment exercise, which was carried out as an aid to comparing the relative safety benefits offered by the various options. The basic features of the options considered can be tabulated as follows. We understand that some of the schemes are still being refined and that distances quoted may change marginally.

Option	Basic length	Main features
A	1463	Existing runway configuration
B	1463	Existing, but west RESA extended to 240m
B2	1700	Extended eastwards, both RESAs 240m
C	1463	Extended west, west RESA 240m, east 198m
C2	1700	Extended east, both RESAs 240m
D (Langlois)	1385	Runway reduced, both RESAs 135m
D (i)	1385	As D (Langlois) but starter extensions reduced
E	1463	Extended west, both RESAs 202m
E+ *	1463	As E but starter extension and T/W D relocation
E2	1700	Extended east, both RESAs 240m

* Original baseline scheme

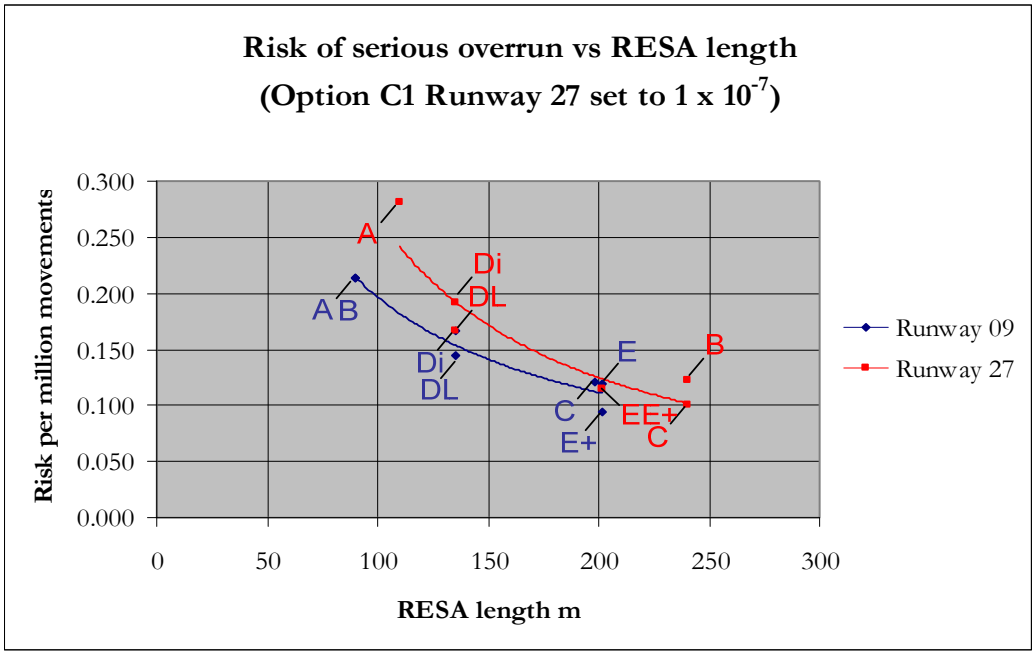
8.2 ***Overrun and Damage Risks***

8.2.1 The risk of an overrun occurring is similar in all the non-extended options, as the landing and take-off distances provided are similar. (We have not assessed risk for the 1700m options, as these all include full-length RESAs). In all cases the risk would fall within the CAA's criterion that the likelihood of an overrun occurring should be 'remote', i.e. somewhere between 1×10^{-5} and 1×10^{-7} per aircraft movement (1 in 100,000 to 1 in 10 million. There is some variation because some options result in slightly more or less than the nominal 1463m take-off or 1458m landing distances. All present similar overrun risk on Runway 09, except E+ which has a slightly lower risk

due to the improved take-off distance provided by its starter extension. In the Runway 27 case, Options C, E and E+ offer a somewhat reduced risk, also due to longer take-off distance.

8.2.2 Greater differences between options are seen when the consequences of an overrun are considered, i.e. the effect of runway end conditions on the probability of an overrun resulting in serious damage to the aircraft. Because the RESA itself provides a relatively benign environment for an overrunning aircraft, the risk of damage is a combination of two factors; the size of the RESA and the damaging obstacles that may lie beyond it. A shorter RESA means an overrunning aircraft is more likely to run beyond the clear, well-graded area, and is likely to suffer serious damage if it then encounters obstacles such as abrupt changes of level, walls and the like. It also follow, therefore, that the longer the RESA is, the less the topography beyond it will matter in terms of damage risk.

8.2.3 This effect is illustrated by the following graph, which plots the assessed serious overrun risk for the range of options against their RESA lengths. It can be seen that risk reduces with length, but the benefit gained gradually diminishes. It can also be seen that, in this Guernsey case, RESA lengths of about 200m and above yield similar, relatively low levels of risk.



8.2.4 In all the non-extended options the end of the Runway 09 RESA lies at the same point, just inside the existing Airport boundary. The end of the RESA is marked by the ILS LLZ antenna, which is frangible, followed by a downslope and the earth banks of La Villiaze Road. Both the latter are significant obstacles that would be likely to severely

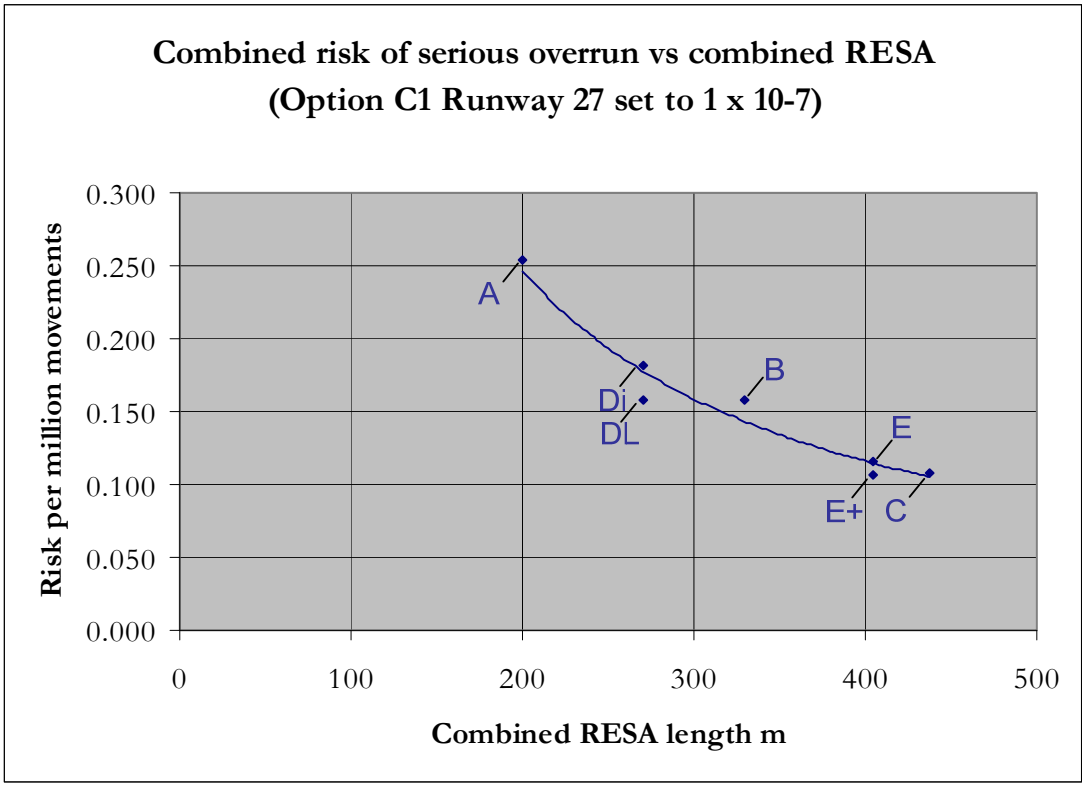
damage an aircraft and bring it to a halt. The relative risks of serious overrun from Runway 09 therefore depend only on RESA length.

8.2.5 In the runway 27 direction, the end of the RESA would also be set by the LLZ antenna and the downslope of the embankment forming the RESA platform. Although on this runway the location of the RESA end varies, and there are therefore differences in the obstacles that an overrunning aircraft would meet, the critical obstacles would be the LLZ antenna and the embankment drop-off. Because of signal generation requirements, the 27 LLZ will have to be raised above the general RESA platform level, by means of either an earth slope or a fabricated support structure. The former would increase the damaging effect of the drop-off behind it, while the latter would not be frangible and thus also pose a significant hazard. In either case an aircraft is likely to be brought to halt at or close to the RESA end. Again, therefore, the relative risks of serious overrun from Runway 27 essentially depend on RESA length.

8.2.6 To facilitate comparison of the risks associated with the various options, we have assumed that the runway with a full-length 240m RESA and the longest runway length (Option C in the 27 direction) has a serious overrun risk of 1 x 10^{-7} per movement. This value equates to the maximum acceptable serious overrun risk according to CAA criteria. Risk values for the other options can then be compared with this 'baseline' value. The following table shows the comparative risks on this basis, for the two runways separately and in combination. The combined figure allows for the difference in annual usage of the two runway headings.

Option	Runway 09		Runway 27		09 + 27
	RESA	Serious overrun risk x 10^{-7}	RESA	Serious overrun risk x 10^{-7}	Combined risk
A	90	2.13	110	2.80	2.54
B	90	2.13	240	1.23	1.58
C	198	1.21	240	**1.00**	1.08
D (Langlois)	135	1.45	135	1.66	1.58
D (i)	135	1.66	135	1.91	1.81
E	202	1.19	202	1.14	1.16
E+	202	0.95	202	1.14	1.07

As an indicator of the overall benefits of the options, the graph below shows the combined risk figures against the sum of RESA lengths.



8.3 ***Option A***

8.3.1 We do not believe it would be acceptable to the CAA to carry out the extensive changes proposed to the runway without, at the same time, achieving improvement in the RESA situation. Our own previous work demonstrated that the existing RESAs at 110m and 90m do not, on the criteria suggested by the Authority, provide a tolerable risk of serious overrun.

8.3.2 Although the CAA takes a reasonable approach in such cases (see 1.2.3), the RESA shortfall is a long-standing feature of Guernsey and there is some history of overruns. It would be unreasonable (were this a UK licensed aerodrome) to expect the Authority to pass up the opportunity of major works to enforce some improvement in this aspect. The fact that other options considered here show that RESA improvements are feasible and affordable can only reinforce this view.

8.3.3 The table at 8.2.6 shows that the risk of a serious overrun with this option is likely to be in the order of 2.5 times the baseline level. While this level of risk is still remote the assessment demonstrates that other options would offer substantial improvement.

8.4 ***Option B***

8.4.1 In this option the west RESA is improved to the full recommended distance of 240m. As the scheme does not otherwise affect Runway 27 distances, the option should be acceptable in this respect. However, all operations must be afforded a tolerable level of overrun risk so, on the same arguments as applied to Option A, it would not be acceptable to leave the Runway 09 RESA at an unimproved 90m. The tabulation shows that, while the overall risk figure is a significant improvement on Option A, the risk in the 09 direction remains relatively high.

8.4.2 The version of Option B extended to 1700m would, at very considerable cost and impact, provide full 240m RESAs at both ends. The CAA would thus have no reason to reject the scheme on the grounds of overrun risk. Option B would therefore be acceptable if it encompassed extension to 1700m from the outset, but we do not believe this is a credible course of action.

8.5 ***Option C***

8.5.1 This option provides a west RESA at the full 240m and an increase in east RESA length to 198m. It also gives an increase in the effective length of Runway 27 of 120m. Its acceptability in overrun risk terms therefore rests on the acceptability or otherwise of the east RESA, at 82.5% of the recommended length.

8.5.2 The effect of the less than full length RESA on 09 is evident in the runway risk figures, but this option yields the second lowest combined risk level, very close to the baseline.

8.5.3 The version of Option C extended to 1700m would provide full 240m RESAs at both ends. The CAA would thus have no reason to reject that scheme on the grounds of overrun risk.

8.6 ***Option D***

8.6.1 This option seeks to reasonably minimise the impact of the scheme by two means. The first (in the Langlois proposal) is by keeping the works within the Airport boundary while increasing take-off distances by the use of starter extensions. It does result, however, in a 68m loss of landing distance on both headings.

8.6.2 The variant scheme D(i)reduces the lengths of the starter extensions to accommodate an embankment for the end of the RESA to tie into existing levels. Existing take-off distance is maintained but there is, again, a loss of landing distance available.

8.6.3 The main effect of both variants from a safety standpoint is the provision of 135m RESAs at each runway end. There is thus a 45m increase in east RESA length over existing while the west RESA is increased by 25m. The acceptability of the scheme therefore depends

on the overrun risk level provided by RESAs that are greater than the minimum 90m but still substantially below the recommended 240m.

8.6.4 The increased take-off distances available in the Langlois variant compensate for the reduced landing distances, but this effect is outweighed by the relatively short RESAs at both ends. RESA length has an even greater effect in the variant scheme, which lacks the compensating take-off lengths. As a result, the overall risk of serious overrun with Option D is similar to Option B or higher, and substantially greater than the baseline value.

8.7 ***Option E***

8.7.1 This option is essentially similar to Option C, providing much the same runway distances but with the RESAs balanced at 202m each end. Specifically, this reduces the impacts and extent of works required at the west end. A variant, referred to here as Option E+, adds a 125m starter extension to Runway 09, increasing its take-off distances accordingly, but leaving all other parameters unchanged.

8.7.2 The table shows that serious overrun risk levels with both variants are close to the baseline figure, with E+ gaining a slight advantage from having increased take-off distance in both directions.

8.7.3 As with C, Option E could be extended to give 1700m of runway and full 240m RESAs at both ends, at substantial further cost and with greater impacts on noise, road severance etc.

8.8 ***Acceptability of Options***

8.8.1 All the options promise reduction in the risk of an overrun occurring, through the improvement of runway profile, drainage and surface quality. The options differ significantly, however, in their effect on the risk of an overrun, having occurred, becoming a serious and damaging incident.

8.8.2 We do not believe Option A would be acceptable to the CAA, because it offers no improvement over the existing situation in terms of the consequences of an overrun.

8.8.3 Option B offers a major improvement in serious overrun risk only on one runway heading, albeit the most frequently used. We do not believe the CAA would be inclined to accept this configuration, particularly as options giving safety improvement on both headings are shown to be feasible.

8.8.4 The Option D variants would improve serious overrun risk in both directions, and have the advantage of minimising local impacts and cost, but we do not believe the gains are sufficient to find favour with the CAA, at less than 60% of the recommended RESA length. The improvements in RESA length of 45m and 25m are gained at the cost

of landing distance. This may be seen as a retrograde step, given that landing overruns are about twice as frequent as those on take-off, and as the two most recent overruns at Guernsey have occurred on landing.

8.8.5 Options C, E and E+ all offer similar degrees of reduction in serious overrun risk and would bring the overall risk level close to that expected with full-length RESAs. Within the precision of the assessment method, the overall risk values for the three options are essentially the same. Option C has one full-length RESA (although one corner is cut off due to land constraints), on the most used heading, and one 83% of full length, and increases 27 take-off distance by 120m. Options E and E+ have balanced RESAs all at 84% of full length. Option E increases 27 take-off distance by 125m, while E+ adds 125m in both directions.

8.8.6 The impacts of these three options at the east end are minimal, but vary at the west end in the extent of land and fill required and the proximity of departing aircraft to surrounding properties. Option C requires the most land but, practically, all these options are likely to take up the land parcels bounded by Route de la Tourelle and all require the removal of two properties on the south side of the Airport boundary which are already in Airport Authority ownership. Departing aircraft would start their runs further west with Option E+ because of its starter extension. Also due to the starter extension, Option E+ would require additional land and filling to extend Taxiway D to the runway end, which would also place taxiing aircraft closer to properties along Route de Plaisance and probably require the removal of the same two properties.

8.8.7 We understand that Option E has been presented to the CAA and is considered by them to be a "reasonable and acceptable" scheme, indicating no objection in principle to 202m RESAs. Given that Option C provides a full-length 240m RESA on the most used runway and very close to 200m on the other heading, we believe it would be similarly acceptable to the CAA and likely to be preferred. Option C takes full advantage of the land reasonably available, within the constraints of topography, engineering practicality and cost, to produce substantial improvement in overrun risk.

8.8.8 In conclusion, based primarily on comparative risk assessment and taking reasonable account of local impact and other factors, we believe Options C, E and E+ would be acceptable to the CAA and thus likely to find favour with the DCA. Overall, we believe Option C offers the greater overrun safety benefit.

8.9 ***Other Recommendations***

8.9.1 It has been noted that proposed RESA widths are less than optimum, and that the risk of damage depends heavily on the nature of

obstacles at and beyond the RESA edge. Whichever option is selected, we would emphasis the importance of minimising the potential damaging effect of these features.

8.9.2 To the extent that space permits, embankment side-slopes should be as shallow as possible and slope changes at the RESA edges as gradual as practicable. Whatever method is chosen to support the LLZ antenna, it should be engineered to minimise its potential to inflict damage on an aircraft colliding with it or passing beyond it.

Appendix A; Terms of Reference

TERMS OF REFERENCE FOR AUDITING CONSULTANT

Background

The States of Guernsey Public Services Department has appointed design consultant RPS to design and manage the airside rehabilitation works at Guernsey Airport. The primary reason for the project being the deterioration in the condition of the pavements and their assessed PCN. The design is now progressing and in consultation with the Project Team[6], decisions have been made on the detailed scope of the project.

The existing runways, aprons and taxiways at Guernsey Airport do not comply with the requirements of CAP168 in a number of respects, including horizontal and vertical alignment. In addition, whilst the runway end safety areas currently meet the minimum requirements they fall short of the recommendations and Guernsey has had two aircraft overruns in the past decade.

Preliminary cost estimates indicate that substantial expenditure is required for the project. This project is intended to provide the Island with a facility equivalent in aircraft capability to the existing facility, but with appropriate safety characteristics to suit the proposed introduction of Embraer 195 services (subject to a 500mile range restriction).

Design Options

Two main options (referred to as options 'C' and 'E') have been determined by the Public Services Department as worthy of inclusion in its next submission to the local parliament.

Up to three additional options ('A', 'B' and 'D') are also under consideration. These options focus on variations to the configuration of the Runway and RESA lengths.

The Department in conjunction with its consultants has had to interpret the CAA/ICAO requirements and recommendations and have sought to achieve a reasonable 'compromise' in a number of respects, where it believes full compliance cannot be practically achieved.

There is understandable concern that these reasonable compromises entail significant judgement. If this judgement is over-onerous then this may have unreasonably increased the budget estimate, however if the interpretation has been under estimated then the airport may not be as future-proofed as is intended.

Specifically the Department has faced challenges by members of the Public who are potentially affected by the scheme as to the exact requirements for Runway End Safety Areas.

Services Required

The Auditing Consultant is required to review the design options for compliance with CAP 168 and to indicate areas where it is believed either that the existing designs are non-compliant or where the

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6 The Project Team consists of members made up of Airport Management, Public Services Department representatives, civil engineers and a States of Guernsey legal advisor.

design may be relaxed whilst still maintaining compliance. He is to provide specific advice on the minimum appropriate RESA lengths for both a 1463m (i.e. the existing runway length) and 1700m runway length taking account of the current aircraft types and the Embraer 195.

Guidance is required from the auditing consultant on all five options in terms of the appropriateness of compliance achieved and in likely regulatory acceptability. Specifically the consultant should offer advice on the minimum lengths of RESAs that, based on experience, the consultant would be confident that a sufficiently persuasive safety case could be presented to any reasonable civil aviation regulator. Options for the provision of improved RESA's could include either physical land provision i.e. grass RESAs or a combination of grass RESA and arrestor bed. Some comment on the use of the latter is required in the audit report.

For this reason PSD requires that a qualified aviation consultant audit the decisions for the options that have been proposed together with the 1700m sub-options for extension and to make any recommendations for any changes in scope as appropriate.

Resources

RPS will be instructed to provide a full briefing to the auditing consultant and will be made available for consultation throughout the process.

Fergus Woods is the Director of Civil Aviation for Guernsey and he will be available for reference, but will maintain an independent role such that the advice provided by the Auditing Consultant is not influenced by the Director's own opinion. The Director alone is responsible for the granting of the licence for the airport and is able to take guidance from the requirements of either the CAA's CAP 168 or ICAO Annex 14.

Timetable

It is intended that the Auditing Consultant will be appointed in March 2009 and will be required to provide an interim verbal report for consultation with the Project Team in mid-May 2009, with a final written report to the Public Services Department by 1st June 2009.

Appendix B; 2008 Wind Data

Guernsey
Airport
Cross Winds; Percentage Distribution Over Year (2008)

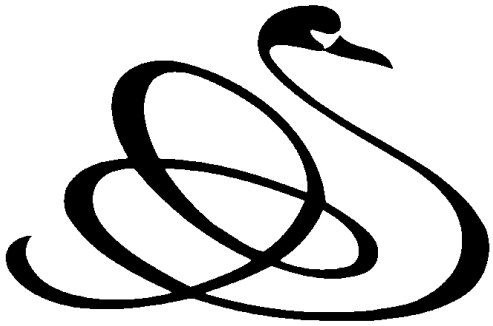
	Southerly			Northerly			
Bearing	140 - 160	170 - 190	200-220	320-340	350-010	020-040	
Speed kt	Percentage of hours						Totals
0-3	0.0	0.0	0.0	0.0	0.0	0.0	0
04-10	4.0	2.6	4.0	3.6	2.3	2.9	19.4
11-21	1.3	1.9	7.7	3.3	1.6	2.6	18.4
22-33	0.3	0.2	0.9	0.1	0.2	0.0	1.7
> 34	0.0	0.0	0.0	0.0	0.0	0.0	0
Totals	5.6	4.7	12.6	7.0	4.1	5.5	39.5
100% = 8,760 hours							

Crosswinds, 40 degrees either side of N or S, apply at Guernsey Airport for almost 40% of the year.

Approximately half of these crosswinds are at 11kt or higher.

Some impact on aircraft operability is likely above 20kt.

Appendix 3



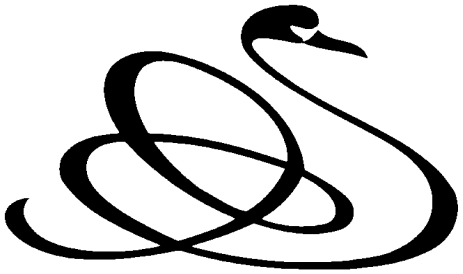
York Aviation

THE STATES OF GUERNSEY POLICY COUNCIL

AIRPORT DEVELOPMENT – ECONOMIC ASSESSMENT OF OPTIONS

Final Report

June 2009



York Aviation

Originated by: Richard Connelly

Dated: 4th June 2009

Reviewed by: Louise Congdon

Dated: 17th June 2009

THE STATES OF GUERNSEY POLICY COUNCIL

AIRPORT DEVELOPMENT – ECONOMIC ASSESSMENT OF OPTIONS

Contents

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EXECUTIVE SUMMARY

Background

1. In February 2009, the States of Guernsey commissioned York Aviation LLP (YAL) to undertake an economic assessment of the options for the development of the Bailiwick's main airport (GCI), particularly in respect of the different options for refurbishing and/or extending the airport runway. The primary aim was to consider economic and social consequences for the islands arising from the development options. The study has been overseen by The Policy Council with support from Commerce and Employment (C&E) and the Public Services Department (PSD). The study has addressed the following key issues and questions:

   - the current direct, indirect and induced employment and Gross Value Added (GVA) effects of the Airport on the Island's economy;
   - the relationship between the Airport, air services and the wider economic growth;
   - the current air travel market conditions;
   - the reliance of the Island on services to London Gatwick and the potential vulnerability;
   - the need for air services to support the economy in the future;
   - the development options and what they can deliver operationally;
   - the risks associated with changing airline strategies;
   - funding the development, including the balance between direct charges to airlines and any funding 'gifted' by the States.

Economic Background and the Current Impact of the Airport

2. In the first instance, we assessed the direct contribution made by the operation of the Airport to the Island's economy. In order to establish this, we undertook an employment survey of companies operating at the Airport, including the airport management, airlines, handling agents and concessionaires. We established that, at present, the Airport supports 649 full-time equivalent (fte) direct jobs and provides an income injection of £31.2 million into the Guernsey economy, through direct, indirect and induced employment and operations. However, it is clear that the main economic benefit from the Airport comes from the contribution it makes to the connectedness of the Bailiwick as a place to live, work and visit rather than the direct impacts of the operation.

3. Guernsey is heavily dependent on air service connections and these have been of critical importance in sustaining the tourism industry and in attracting businesses in the financial and insurance sectors. In particular, the financial services sectors contribute to high average earnings and in turn one of the highest GDP's per capita in the world. Retaining companies generating high salaries is important as income tax represents the primary source of revenue for the funding of public services on the Island.

4. It is widely accepted that the financial services sector is highly dependent upon air travel worldwide, but this is more relevant in the case of Guernsey due to air travel being the principal mode of transport available to access outside markets as ferry travel is not suitable for the needs of business travellers. Consultations with stakeholders suggested that if, as a result of any restrictions on the use of the Airport, air service provision was to be reduced, particularly in relation to services to London, some firms could quickly relocate away from the Island to jurisdictions with a better level of connectedness to major business centres.

5. Using our Value Connectivity Index, which is a measure of how well connected an airport is to useful business destinations, Guernsey falls between Jersey (better connected) and the Isle of Man (marginally less well connected) in terms of the performance of key competitors in attracting financial and insurance firms. The excellent links to London are a major contributor to this, and the high frequency of services to this destination are well liked by the business community, with frequency being a higher priority than cost for this type of traveller. Other UK regional routes are valued, both for business purposes and as opportunities to attract inbound tourism.

6. With respect to tourism, the shape of this industry on the Island is changing towards shorter stay breaks and moving away from more traditional week long holidays. These shorter breaks are dependent upon easy access at reasonable cost, with many decisions made on the basis of where travellers can get to directly from their local airport at a reasonable fare. The tourism market in Guernsey is dominated by visitors from the UK, amounting to over 80% of all tourists.

Market Assessment

7. We have analysed Civil Aviation Authority (CAA) Survey data in relation to passengers travelling to and from Guernsey to UK airports, and established, based on sampled routes, that around 59% of passengers live on the Island, whilst the remaining 41% are inbound. Leisure travellers make up the majority, with 74% of passengers travelling for leisure purposes and only 26% travelling on business. However, the value of these business travellers must not be underestimated due to the fares they are willing to pay for convenient schedules, which is important in sustaining the financial viability of air services which can, in turn, be used for other purposes.

8. The wider policy considerations of the States, which limit the population on the Island along with the apparent lack of desire by the hospitality sector to develop growth in bed spaces in hotels, do act as a limit on the growth potential of the air services serving the Airport. Our analysis of the market indicates that there are few additional destinations which offer strong market prospects for direct services in the immediate future. This view was shared by local stakeholders, who did not suggest that there were particular cities missing from the current service portfolio. The overwhelming requirement was the maintenance of the link to London, along with the ability to connect to points globally. Our analysis of these connections shows an absence of particular concentrated flows.

9. The inbound tourism industry is keen to see seasonal links from Germany and the Netherlands continue and there are cultural links with France. Over and above this, there is little expectation of new services. Hence, our expectation that the Airport is likely to see only marginal growth in passenger numbers over the coming years, consistent with the incremental growth seen in the recent past.

10. Taking these factors into account, and the relatively low growth seen at the Airport over the period since 2001, we have estimated that a growth rate of around 0.7% per annum is the most reasonable basis for considering the market potential for the Airport unconstrained by any physical runway limitations. On this basis, the Airport would be handling just over 1 million passengers per annum (mppa) by 2030.

11. Hence, consideration of the development options for the Airport is not about creating a platform for growth. Rather, the concern is primarily to ensure that the existing key services are maintained. As was made clear in the brief for this study and in our discussions with stakeholders, there is a concern that either structural or technological changes within the aviation industry will result in airlines no longer having the aircraft available which could use a 1,463m runway at GCI or that pricing policies at other airports, particularly Gatwick, will price out operations by smaller aircraft.

12. Our discussions with stakeholders revealed the critical importance of the link to London Gatwick, both in terms of direct access to the World's financial capital in London and as a connecting service allowing global access for business and leisure purposes. It was suggested that some firms would withdraw from the Island if the Gatwick link was lost. The concerns in relation to Gatwick are:

    - ✈ that slots will become more valuable at London Gatwick over time and smaller carriers will choose to realise the value of these slots by selling them for more lucrative operations to other airlines, with regional operations being effectively forced out of Gatwick; and/or

    - ✈ concern that pricing policies at Gatwick may be altered to further favour larger aircraft and make it uneconomical to operate smaller aircraft and that any replacement larger aircraft would be unable to operate into/out of Guernsey's runway whether by existing airlines or alternative operators of larger aircraft.

13. We consider that these concerns may be overstated, at least in the short to medium term, in the light of decreasing average aircraft size and increasing slot availability at London Gatwick. Furthermore, the imminent sale of London Gatwick may generate lower airport charges as the new operator attempts to compete with the other London airports for business. In the longer term, there is also the potential for additional runway capacity at both London Stansted and London Heathrow which would alleviate some of the slot constraints within the London system as a whole, thereby reducing the likelihood of airlines being squeezed out of the market.

14. Finally, in relation to Gatwick, the recent announcement by Flybe that they are opening a hub at London Gatwick should provide some comfort to Guernsey because it shows a commitment to the Airport by the airline. This will lead to Flybe having an aircraft based at the Airport for the first time, and in order to make the base work as a hub, the airline will need adequate connections to be attractive. Guernsey would seem to be a key connection within this context.

15. In terms of the benefits of extending the runway allowing operations by larger aircraft and potentially lower fares airlines, our analysis has identified a potential tension between the requirements of the business community for high frequency, appropriately timed services and the requirement more generally for routes to a range of UK and European points, and the likelihood that larger aircraft and lower fares would crowd other services out of the market. Our assessment is that the Guernsey market overall is likely be better served for the time being by higher frequency services by smaller aircraft capable of using the existing runway length, as access to the facility by larger aircraft will only flood the market with seats, leading to reduced frequency, and potentially reduced numbers of destinations. Furthermore, as seen at Jersey, operations by larger aircraft tend to be at times of the day which are less convenient for business travellers and can make day return business trips impossible.

Development Options

16. At the current time, the runway, taxiways and apron areas of Guernsey Airport are in urgent need of refurbishment due to surface and pavement strength degradation which has occurred over the time since the last major refurbishment of the runway 30 years ago. Whilst reviewing the works necessary to bring the facilities back to the required standard, the airport management and Public Services Department (PSD) also assessed that the works were likely to trigger a requirement to make changes to the Runway End Safety Areas (RESA's) at each end of the runway to meet UK CAA standards, as adopted by the Island. Our experience of similar runway development and refurbishment works is that such works to a runway would normally trigger a requirement by the CAA to provide RESAs to the current standards.

17. Whilst a number of schemes have been presented, we have assessed three main options, these being:

    - Develop 240m RESA at western end, and 198m RESA at eastern end, reposition runway and retain 1,463m of runway with starter extension on old concrete at eastern end;

    - Provide 240m RESAs at both ends and extend runway to 1,700m as a further development to the option above; and

    - Provide equal RESA's of 202m at both ends, retain 1,463m runway with starter extension on old concrete at eastern end.

18. Of these schemes, the first is designed to be easily extended at a future date if necessary, whilst providing a similar capability to the third in terms of short to medium term operations. The additional cost of the first scheme over the third is around £1 million, but would potentially save £5 million, at current prices, if the runway needs extending at a later date compared to extending the third scheme option.

19. We have assessed the range of aircraft types available and likely to be available for the foreseeable future – at least 10-15 years. Aircraft manufacturers are actively developing aircraft with the range and capacity to operate from shorter airfields than Guernsey and, in particular, the manufacturers are keen to develop aircraft which can operate into and out of London City Airport, with a runway length of only 1,319m in the light of the requirement to serve that Airport by a number of major carriers. Relevant aircraft would have seating capacities up to around 120 seats. We believe that so long as London City Airport remains an important point on many airlines' networks within Europe, regional aircraft and smaller narrow body jets will be developed to fly from short runways such as that at London City. Taking a small selection of such aircraft types shows that the worldwide fleet (orders and operational) as at May 2009 is around 1,700 aircraft which could operate from Guernsey, not including older types such as the BAe-146 and ATR-72-200. Furthermore, aircraft such as the Canadair C-100 and C-300 are only newly launched and likely to attract significant further orders.

20. Taking into account the scale of the Guernsey market, we do not consider there is a pressing case for a longer length runway than that available currently. We have considered the risks associated with remaining with the existing runway length and consider such risks to be minimal in the short to medium term in the light of the number of small regional jet and turbo-prop aircraft in manufacture and being acquired by airlines capable of serving Guernsey. We would, however, caution against runway options which result, or potentially might result if the CAA did not accept the RESAs, in a shorter runway length. In our view, this rules out some options put forward informally by stakeholders.

21. However, whilst we have considered what is known about future aircraft types and the requirements for access to London and/or other hubs, we cannot be certain that over the longer term there will not be pressure for a longer length of runway at some date in the future. There may be changes in the airline market over the longer term which could lead to a requirement to introduce larger aircraft requiring a longer runway.

22. In the light of this, on the basis of the option costings supplied to us by RPS Burks Green, it would appear prudent to consider spending a small amount more at this stage to facilitate the later provision of an extended runway at a later date. Securing the ease of development will cost £1 million extra in the short term, but could save £5 million in the longer term.

Economic Assessment of Development Options

23. In order to consider the implications of the development options on the economic position of the Island, and in order to derive a cost benefit analysis, it is necessary to compile a set of scenarios which are based on assumptions about development works and passenger growth. For Guernsey, we have developed three scenarios, one with two sub-scenarios, these are:

- **No Development** - this is a hypothetical only scenario as we understand the States is committed to, as a minimum, refurbishing of the hard surfaces and providing adequate RESA's. This scenario forms a counterfactual for the analysis i.e. a base against which the impact of undertaking development works can be measured. Under this scenario, the only services which can be supported are those to Jersey and Alderney, with the loss of direct London services.

- **Refurbishment of Current Infrastructure** - this scenario is based on the costs of our preferred option above and assumes that the basic refurbishment of the pavement and RESA works are undertaken and has two sub-scenarios:

  (a) the runway is not long enough to prevent the **withdrawal of Flybe services to London Gatwick** over time, although Aurigny services to Gatwick continue as do Flybe services to all other points. It is assumed that Flybe withdraw this link in 2020 for the purpose of appraising the options. All of those passengers who would have previously flown with Flybe to/from Gatwick are lost; and

  (b) the runway is **long enough to sustain all of the services** for the whole period and no passengers are lost;

- **Refurbishment and Extension of the Runway** - this scenario assumes the full runway extension is provided immediately in order to safeguard the operations to the Island, but does not generate additional growth in the short to medium term, in line with our market assessment.

24. In appraising these scenarios, we have undertaken an economic assessment based upon:

- Journey Time Savings;
- Air Fare Savings;
- Construction Costs.

25. We have quantified the benefit to Guernsey from ensuring that the Airport remains able to handle the current portfolio of operations. In terms of economic welfare, the value to the Island of the current portfolio of services over a 30 year period with modest growth is some £645 million in net present value terms, net of the cost of refurbishing the runway on its current length. Loss of some Gatwick frequencies would erode this benefit by some £80 million (down to £565 million).

26. Whereas extending the runway now without any likelihood of higher overall traffic growth, leaving aside the risk of detriment to the quality of service, would simply add cost and reduce the net present value to the Island of the development, the critical issue is the risk of the partial loss of services to Gatwick. As stated, we do not consider this risk to be imminent but if we assume the risk was real in 2020, then the net present value of development reduces to £615 million due to the additional costs involved in extending the runway in the short term.

27. However, in the face of limited scope for market growth, the provision of a longer runway is simply a cost without any incremental benefit. The need for a longer runway then comes down to an assessment of the risks attached to not providing it at the present time. We consider these to be minimal in the short to medium term but that the risk does exist in the longer term, at least in terms of the risk to the Gatwick route. The loss of benefits should even some of these services be lost would suggest that there would be a case for incurring the incremental cost of the runway extension scheme at a future date and for safeguarding the cheapest means of providing such an extension by selecting the option best able to facilitate that, albeit at a marginal incremental cost now.

Funding Options

28. The scheme to refurbish the runway and the remaining pavement areas at the Airport, even without an extension to the runway, comes at a high cost estimated at £84.5 million. If these costs were fully passed onto users of the Airport through increased airport charges or direct charges to passengers, in our view, such an increase in the cost of using the Airport would lead to a reduction in demand and the range of air services available. This would have a damaging effect on the Island's economy more generally because of the impact on the tourism industry and because of the effect of reductions in the range and frequency of air services impacting on the attractiveness of the Island as a business location.

29. Concern was raised by some stakeholders that air fares are already very high and this is a consideration in terms of the scope for passing on the cost of development to users. However, our analysis of comparative air fares with Jersey shows that the discrepancy in fares may not be as much as envisaged. Nonetheless, the impact of passing through the full cost of development to airport charges would have an adverse effect on demand.

30. Our assessment of the price sensitivity of the market is such that, even allowing for Guernsey to be at the lower end of the short haul price sensitivity range, would suggest that anything more than a nominal increase in airport charges runs the risk of passenger demand being reduced and airlines withdrawing capacity. It may be possible to manage the impact an increase of the order £1.95 per passenger, as has been suggested by some consultees, albeit with some risk of damage to the market. Increases in charges above these levels would, in our view, give rise to substantial damage to the economy of Guernsey as a whole. We consider that the level of benefits generated for the Guernsey economy would justify some level of support to be gifted by the States as our NPV appraisal demonstrates substantial net benefits even after taking account of the cost of development.

31. Although in theory, the benefits to users from improved airport infrastructure should be able to be captured by an increase in price, in this case, the benefits are largely wider societal and economic benefits for the Islands of Guernsey as a whole, such as retention of employment and employees. These wider benefits are not capable of being captured by the airlines by way of increased air fares, airport charges ultimately forming part of the air fare even if shown separately. Hence, there is a case for some level of funding to be 'gifted' by the States in recognition of these wider benefits.

1 INTRODUCTION

Background

1.1 In February 2009, the States of Guernsey commissioned York Aviation LLP (YAL) to undertake an economic assessment of the options for the development of the Bailiwick's main airport (GCI), particularly in respect of the different options for refurbishing and extending the airport runway. The primary aim was to consider economic and social consequences for the islands arising from the development options. The report has been overseen by The Policy Council with support from Commerce and Employment (C&E) and the Public Services Department (PSD). This report represents the findings from this assessment.

1.2 GCI is the only airport serving the Island of Guernsey, and one of two within the Bailiwick of Guernsey, with a small airport at Alderney providing a secondary supporting role to the main facility. In 2008, GCI handled 914,000[1] passengers, 3,300 tonnes of freight and 41,600 air transport movements (ATMs). Access to/from the Island is restricted to either travel by air or by sea services to the United Kingdom (UK) and France, and as such air travel represents the most convenient option, particularly in support of business and essential social and lifeline activities.

1.3 The Airport currently has a limited range of services, mainly to the mainland UK, with the strongest link being that to London Gatwick, with services operated by both Flybe and the national airline, Aurigny Air Services. In addition, Blue Islands and Air Southwest also operate services to the Airport.

[1] Civil Aviation Authority Airport Statistics

1.4 The States of Guernsey has been considering a programme of works to upgrade the Airport's hard surfaced areas which are in need of replacement. Until the runway is structurally refurbished, there are restrictions on some types of aircraft which can operate, and this includes Flybe's Embraer 195 jets. Whilst the need to resurface the runway, taxiways and apron (aircraft parking areas) is accepted as essential, the necessity to undertake substantial construction work has presented an opportunity to consider a range of development options and the question of whether the runway should be extended concurrently with the refurbishment works has been mooted.

1.5 Following internal analysis, PSD determined that there were unlikely to be sufficient grounds to extend the runway at this time and that the works should only involve the refurbishment and rebuilding of the surfaced areas as existing and the construction of Runway End Safety Areas (RESAs) to meet Civil Aviation Authority requirements[2]. The analysis undertaken by PSD to determine this position focused on the operational needs of current airline operators, who suggested a runway extension would be a costly development which they did not need to continue serving the Island. Following concerns raised by the business community on the Island, and with advice from their retained aviation consultants[3], C&E considered that further analysis should be undertaken to determine the wider economic implications of extending, or otherwise, the runway with consideration of the potentially changing needs of airline business models and aircraft development. Significant concerns were raised in three areas:

- that developments in aircraft technology would eventually lead to newer types being unable to operate from the current runway length;
- that changes in airline business models may make operation of smaller aircraft obsolete, particularly with the rise of low fares airlines which have typically standardised on aircraft too large to operate to Guernsey; and

[2] The States of Guernsey are not within the jurisdiction of the UK CAA but generally adheres to its requirements
[3] ASM has been retained by C&E in order to promote the Island as a destination to potential new airline operators

- that the Island may lose access to a major hub as, over time, the pressure for slots may lead to smaller aircraft being priced out of the hub system as airports and airlines aim to maximise the value of their slots.

1.6 In essence, the thrust of the concerns was that, should the Island lose adequate air links then, over time, it would not be able to retain, or expand its economic position, with subsequent effects on the wider social well being of residents.

1.7 Furthermore, the States of Guernsey have been considering how to fund the development at the Airport, whatever the final scheme. Under consideration are a range of options from the full cost being passed through to the airport users (the airlines) via increased airport charges through to the full cost being 'gifted' by the States out of existing resources. Whilst the main part of our brief was to assess the socio-economic case for extending the runway, against the base case of refurbishing it to maintain its existing operational length, we were also asked to provide advice on the extent to which there is a case for funds towards the cost of development, under either option, being 'gifted' by the States in the light of the wider economic benefits to the Island and in the light of the willingness and ability of airlines to pay higher airport charges.

1.8 In undertaking the study, we have reviewed a number of documents and undertaken consultations with a number of individuals and organisations. We set out a list of those we have consulted in **Appendix A**. We highlight the issues raised by stakeholders as appropriate throughout the report.

Study Aim and Objectives

1.9 The aim of this study is to provide an overall assessment of the role of Guernsey Airport in supporting the economy of Guernsey and to link this to physical options proposed, with consideration to future demands and potential changes within the wider aviation industry.

1.10 More specifically, the study has addressed the following key issues and questions:

- the current direct, indirect and induced employment and Gross Value Added (GVA) effects of the Airport on the Island's economy;

- the relationship between the Airport, air services and the current wider economy;
- the current air travel market conditions;
- the reliance of the Island on services to London Gatwick and the associated vulnerability;
- the need for air services to support the economy in the future;
- the development options are and what they can deliver operationally;
- the risks associated with changing airline strategies;
- funding the development and the extent to which the development costs could be passed through to airline users and how 'gifted' by the States.

The analysis is pulled together into a cost benefit assessment of the development options.

Structure of this Report

1.11 The report is structured as follows:

- in **Section 2**, we set out a profile of the current economic position of Guernsey, the importance of retaining this position, and the current relationship between the Airport and the economy, both quantifiable and non-quantifiable;
- in **Section 3**, we undertake an assessment of the air passenger market in relation to Guernsey, with consideration given to the scope for growth and the potential future needs of the Island to sustain the economic vision;
- in **Section 4**, we consider the development options proposed and the cost and operational implications of each development alongside an assessment of the wider aviation sector and how the needs of the industry can be met by each scheme;

- in **Section 5**, we provide economic assessments of a small range of developments scenarios and outcomes, including cost benefit analysis and estimates for future direct, indirect and induced impacts;
- in **Section 6**, we consider the options for funding development at the Airport;
- in **Section 7**, we draw out recommendations from the report and provide present our conclusions;

2 ECONOMIC BACKGROUND AND THE CURRENT IMPACT OF THE AIRPORT

2.1 In this section, we examine the current economic position of Guernsey and the role which the Airport and air services play in supporting the economy.

Current Economic Position

2.2 As highlighted by the Strategic Economic Plan[4], although Guernsey holds fiscal independence, its small size "*impacts on the nature of the economy required to sustain the community*". Of particular importance is the balance between achieving adequate income to fund public services and remaining competitive in sustaining economic activities. As many goods and services are imported, it is strategically important that the Island can attract and sustain growth of 'outward facing' businesses, which generate export income and contribute to a net surplus on the economy as a whole.

2.3 Historically Guernsey's economy has been supported by a number of sectors, partly aided by its location and associated temperate climate compared to the UK. Horticulture, agriculture and tourism provided much of the Island's economic growth in the post war period. More recently, agriculture and horticulture have both experienced a decline due to the ability of other nations to produce and export on a larger scale with lower associated costs. In the 1960s and '70s, tourism was strong due to the proximity of the Island to the UK mainland (the primary market) and because its climate was favourable. However, this industry has been impacted by the growth in affordable choice to warmer parts of Europe, for example the mass growth of package tours to Spain, Portugal and Greece.

[4] Strategic Economic Plan, Fiscal & Economic Policy Steering Group, July 2007

2.4 Consequently, the States have encouraged growth in other sectors. In particular, the knowledge intensive, high value added, financial and business service sectors have grown significantly on the Island, in part due to a favourable corporate tax regime. In addition, tourism continues to play a role on the Island with approximately 6,000 bed spaces[5] available in Guernsey. **Table 2.1** shows employment on the Island by sector, both in real terms, but also as an expression of the total employment on the Island. It can be noted that the Finance and Legal sector is the largest single employment sector on the Island.

Table 2.1: Employment by Sector, March 2007

Sector	Employees	% of Total Island Employment
Primary	1,000	3.2%
Manufacturing	1,239	3.9%
Construction	2,964	9.4%
Utilities	365	1.2%
Transport	1,160	3.7%
Hostelry	2,005	6.3%
Supplier Wholesale	678	2.1%
Retail	3,844	12.1%
Personal Service	859	2.7%
Recreation/Cultural	475	1.5%
Finance and Legal	7,508	23.7%
Business Services	1,643	5.2%
Information	768	2.4%
Health	1,261	4.0%
Education	364	1.1%
Public Administration	5,229	16.5%
Non-profit	267	0.8%
Unknown	35	0.1%
Total	**31,664**	**100%**
Source: Guernsey Facts and Figures 2008, Policy Council		

[5] Visitor Economy Strategy, Commerce And Employment, December 2006

2.5 Guernsey had the 12th highest GDP per capita in the world in 2008[6]. In 2007, the GDP per capita was £26,946[7]. The overall gross value added (GVA) of the Island was £2.07 billion for the same year. The high GDP per capita and high GVA both arise as a result of the contribution paid to the economy by the financial sector, with financial, legal and business services sectors on the Island making up around 29% of all employment in 2007, as illustrated in Table 2.1.

2.6 The nature of employment on the Island is important as income tax represents the primary source of revenue for funding public services, with £296 million[8], or 81% of the Island's income raised through this source in 2007. The average salary for the same period on the Island was £30,452, which is high relative to the UK at £25,100 in 2007/8. Hence, balancing the public income with the necessary level of revenue expenditure by the States requires the average salary to be retained at a level commensurate with the public services offered. This requires retention of high value added knowledge based sectors.

2.7 The presence of the high value financial services sector on the Island also has wider spin-offs as highlighted in the Strategic Economic Plan. Induced spending by those employed in this sector has a multiplier effect, generating additional profits and employment in other sectors. This is particularly the case in Guernsey, where much is made of the quality of life, with the provision of good quality restaurants, retail and other facilities associated with high levels of disposable income. These same facilities also contribute to the emerging tourism product of the Island.

2.8 Additionally, whilst the Confederation of Guernsey Industry highlights that it represents light industries, it does suggest that 75% of its members have some reliance on the financial services sector, suggesting that the population and workforce has a strong bias towards being supported by the residents present on the Island as a result of the presence of the financial services sector.

[6] CIA World Fact Book, Country Comparisons - GDP - per capita (PPP), 2008. Guernsey income estimated based on 2005 figures.
[7] Guernsey Facts and Figures 2008, Policy Council, Page 9
[8] Guernsey Facts and Figures 2008, Policy Council, Page 34

2.9 The nature of tourism in Guernsey is still changing. As a consequence, the tourism offer is in a transitional state resulting in a more diverse offer than previously. Tourism on Guernsey has been in decline for a number of years[9], hit by a wider choice of affordable and accessible holidays and short breaks around the world. Historically, the Island was seen as 'bucket and spade' destination for week long visits, but increasingly is changing to become a destination for short and weekend breaks.

2.10 This is a trend which is being seen across the UK, generated by increased disposable income in wider society[10], leading to increased numbers of short breaks away in place of the traditional two week visit to sun spots. This type of break is particularly attractive to couples and this is consistent with the Island's marketing strategy for tourism which is particularly aimed at those travellers over 50 years of age, who are attracted by the product Guernsey has to offer, good quality food, good scenery and character.

2.11 This has not been at the absolute expense of other forms of tourism and the Island has a diverse range of accommodation, with some still attracting the traditional 'Bucket and Spade' tourists, many of whom are repeat visitors to the Island, some over many years. Through consultations, it is clear that in the short term the Island is seeing an increase in enquiries for stays, but this may be driven by the recent weakening of the Pound against the Euro, making stays within the UK and Channel Islands more attractive to some British tourists than travelling into Europe.

[9] Visitor Economy Strategy, Commerce And Employment, December 2006, Page 11
[10] We do not deal here with the potentially short term effects of the current recession in terms of disposable incomes

2.12 The primary source of tourism is the United Kingdom, consistent with the remainder of the Channel Islands. It is estimated that over 80% of tourists are from the UK[11], although this does mean that nearly 20% are from other countries. Summer charter services are provided from Germany and the Netherlands, suggesting that these are the strongest international markets typical of coastal regions and Islands within the UK and Channel Islands. These services are provided as package tours. Whilst this type of holiday is important to the Island, it is often of less economic value overall than independent travel because of the 'all inclusive' nature, meaning that hotels provide rooms and food at the lowest possible cost. Spend outside of hotels tends to be lower than for independent travellers. The same applies to tourists from the UK on packages, and whilst we highlight the lower value of this type of traveller, we recognise that it is still an important sector for the economy.

2.13 It has also been highlighted that meeting the needs of the package tour industry has in part been responsible for some decline in the overall quality of the hotel offer on the Island as it this business may not generate sufficient funds for reinvestment in facilities and refurbishment. Whilst it is not strictly within our remit to consider this issue, the nature and future evolution of the tourism product is important to understanding the link between air service needs and tourism, and therefore the way in which air services must be provided to support the tourism offer available. This will be considered in more detail later in this report.

Contribution of Aviation

2.14 Air services contribute to an economy in broadly two ways:

- **operational impacts** – those impacts related to the economic activity supported by the operation of an airport – i.e. the direct, indirect and induced effects; and

- **impact on the wider economy** – the benefits derived by users of passenger and freight services from access to the connectivity provided by an airport's services. These can manifest themselves in terms of impacts such as increased inward investment, trade, improved productivity or increased inbound tourism.

[11] Visitor Economy Strategy, Commerce And Employment, December 2006, Page 18

2.15 The overall approach that we have adopted in order to consider the economic impact of GCI is based on a framework of five categories of effect as set out in **Table 2.2**. This is the standard framework for analysis advocated by ACI EUROPE, the trade body for European airports, and is commonly used in a wide range of economic impact assessments.

Table 2.2: Economic Impacts Associated with Airports

Impact Category	Definition	Examples
Direct On-Site	Employment and GVA and wholly or largely related to the operation of an airport and generated within the Airport Operational Area	Airport operator, airlines, handling agents, control authorities, concessions, freight agents, flight caterers, hotels, car parking, aircraft servicing, fuel storage
Direct Off-Site	Employment and GVA wholly or largely related to the operation of an airport and generated within the Island of Guernsey	Airlines, freight agents, flight caterers, hotels, car parking
Indirect	Employment and GVA generated in the chain of suppliers of goods and services to the direct activities	Utilities, retailing, advertising, cleaning, food, construction
Induced	Employment and GVA generated by the spending of incomes earned in the direct and indirect activities	Retailing, restaurants and entertainment
Catalytic/Wider	Employment and GVA generated by the attraction, retention or expansion of economic activity as a result of the airport's activity	Inward investors, exporting companies and visitor attractions
Source: York Aviation		

2.16 It is possible to generate robust quantitative estimates of the first four categories of impact shown in the table (direct on-site, direct off-site, indirect and induced). These represent the employment and GVA supported through the operation of the Airport as an economic activity. We present our estimates in relation to these impacts below.

2.17 The issue of catalytic or wider benefits is, however, considerably more complex. The impact of an airport, in this case, is accrued by users of the services. The ability to travel or the connectivity offered by an airport enables business sectors that use air services to operate more effectively, increasing productivity and output and thereby supporting GVA and employment in the wider economy. In the context of a modern developed economy, it is our view that these wider impacts are of considerably greater importance than the direct, indirect and induced impacts and this is certainly the case for Guernsey, given the reliance on air services for the Island as a whole.

2.18 However, quantification of this impact in terms of GVA and employment is not possible, although some quantification of wider tourism benefits is possible. The relationship between air travel and economic activity is an indirect one. It is not possible to say that, for instance, a 10% increase in business passengers leads to a corresponding increase in GVA and employment through inward investment or greater productivity. It is therefore necessary to consider these issues through qualitative analysis and the use of broader indicators of an airport's impact.

Operational Impacts

2.19 We undertook a short survey of the firms whose business is directly related to the airport operations, including, among others, airlines, the airport company, control agencies, handling agents, and freight organisations. In total, 27 companies and organisations employing staff on-site were surveyed for this report. This allowed us to assess the measurable impact of the Airport on Guernsey's economy.

Direct Employment

2.20 The survey work reveals that on-site employment is around 649 full time equivalent employees (ftes). These figures include those employed directly on-site and those employed elsewhere on the Island but directly in support of the Airport's operations. Typically, we would separately identify this as on-site and off-site employment, with off-site being a selected radius of the Airport, but in the case of Guernsey this distinction does not seem particularly meaningful.

2.21 **Table 2.3** compares the structure of on-site employment at Guernsey Airport with the results of a study that we carried out for the Airports Council International (ACI EUROPE), covering 58 airports across the continent[12]. A comparison of this nature allows an understanding of the

Table 2.3: On-Site Employment at Guernsey Airport in a European Context

Employment Category	Guernsey Airport (%)	ACI Europe Study (%)	Variance (%)
Airport Operator	18	14	+4
Airline/Passenger Handling	55	64	-9
Freight/Cargo	8	1	+7
Concessionaires	4	12	-8
Control Agencies	1	6	-5
Other	14	3	+11
Total	100	100	-

Source: York Aviation and ACI EUROPE

2.22 With passenger traffic of 0.914 million in 2008, the density of on-site employment was 710 job opportunities per million passengers per annum (mppa), which compares with an average of 950 jobs per million passengers in the ACI EUROPE study. It should be noted however that the ACI EUROPE study was based on 2002 data, which preceded many of the changes to employment structure in the aviation industry that took place following September 11th 2001 (9/11). These changes will have resulted in a drive to lower costs, including productivity gains and the introduction of new technologies such as self check-in, although such technologies, whilst employed in Guernsey, are clearly not as heavily used as can be observed at some airports. As a consequence, more recent airport specific studies have shown declining ratios of on-site employment to passenger numbers, with airports dominated by low fare airlines often having on-site employment densities as low as the range 450-600. The on-site employment density at GCI does not appear out of line with expectations for a relatively small airport dominated by regional type operations.

[12] ACI EUROPE and York Aviation, The Social and Economic Impact of Airports in Europe, January 2004.

2.23 Expenditure by firms operating at GCI, both in terms of wages and expenditure on goods and services, is estimated as being £20.8 million in 2008 on the Island. This excludes any expenditure off the Island as the economic value of this is not realised by the Bailiwick. This represents an injection of income into the local economy from the operation of the Airport.

Indirect and Indirect

2.24 Using a multiplier, we can calculate the indirect and induced benefits based on the on-site survey of employers. Based our previous experience in undertaking airport economic impact assessments and in considering how income and expenditure from direct operations converts to broader indirectly related economic activity, we have used a multiplier of 0.5. On this basis, we estimate that activity at the Airport currently supports around 310 additional fte jobs in the Guernsey. We estimate that this could add around £10.4 million of income to the economy, over and above the direct operation of the Airport.

Summary

2.25 In summary, our estimates suggest that, in 2008, Guernsey Airport was responsible for:

- 649 full-time equivalent (fte) direct jobs; and
- £31.2 million of income in Guernsey, through direct, indirect and induced employment and operations, of which £20.8 million is a result of direct employment and operations.

Impact on Wider Economy

Business

2.26 This wider economic and social role of airports is called the catalytic impact. The mechanisms through which this catalytic impact can operate include the following:

- as an important element in **company location decisions**, the presence of an international airport can be an important factor in:
  - attracting new investment from outside the area, and especially companies from overseas;
  - retaining existing companies in the area, whether they had previously been inward investors or indigenous operations;
  - securing the expansion of existing companies in the face of competition with other areas;
- promoting the **export success** of companies located in the area by the provision of passenger and freight links to key markets;
- enhancing the **competitiveness** of the economy, and the companies in it, through its fast and efficient passenger and freight services;
- attracting **inbound tourism**, including both business and leisure visitors, to the area.

2.27 There is a significant body of research that has articulated the role of air services in relation to these issues upon which we draw. We have not sought to revisit all of this evidence here but consider the role of GCI specifically and present the broad arguments in relation to the wider role of the Airport and air accessibility in supporting the economy of Guernsey.

2.28 It is widely accepted that for some employment sectors, access to air services can be a major factor in company location decisions, although in our experience this is just one of a basket of reasons that companies choose certain locations. An annual survey of senior executives from 500 major European companies, focusing on issues around location decisions and inward investment[13], found that "*Easy access to markets, customers or clients"* and *"Transport links with other cities and internationally"* were both identified in the top four most important factors in determining business locations in 2008 (2nd and 4th respectively). This is a well established pattern. These key factors, which provide proxies for the importance of air service access, have been amongst the top four factors for many years. In this context, it is important to recognise the role of air services in supporting the knowledge based sectors on which the modern economy of Guernsey is so dependent. Air services provide:

- access to other parts of the organisation, particularly headquarters functions, for inward investors;
- access to markets for indigenous companies and for inward investors seeking to use a region as a base of operations within a world area;
- access to suppliers of goods and services from around the world;
- access to knowledge partners and complementary businesses.

2.29 Whilst the tax regime of Guernsey is likely to be one of the first influencing factors in decisions to locate on the Island, the role of air access cannot be underestimated and is perhaps stronger than for other non-island locations where other transport modes are available. This is particularly so given the high dependence on the financial services sector and the need, in the first instance, to access the global financial capital, London. Access to other global financial centres, such as New York, Hong Kong and Tokyo is also important.

[13] European Cities Monitor, Cushman & Wakefield, 2008

2.30 During our consultations with key stakeholders, it was highlighted on several occasions that air service access considerations had not figured significantly in the decision of many of the key financial and insurance firms to locate on the Island as it was taken as a given that such services would always continue to exist. However, the same consultees highlighted that a reduction in the quality of air service provision, particularly to London, could make trading in Guernsey too difficult by comparison to other locations and it was stated firmly that organisations would be quick to react by relocating to other jurisdictions offering similar tax benefits but with easier access to global markets. In our experience, it is unusual for company directors to be so explicit about the importance of air access to London but this is reflective of the specific needs of an island economy.

2.31 Given the dependence of Guernsey on the financial services, it is worth looking at further evidence of the links between this sector and aviation. Air services are known to be of great importance to the sector, which demonstrates a high propensity to make use of them. Two pieces of research demonstrated this: first, a study by MDS Transmodal Study for the UK Air Freight industry, which analysed the purchases of air transport services by the sector based on 1996 input-output tables; and second, data collected by Oxford Economic Forecasting in 1999 in the course of a study on the contribution of the aviation industry to the UK economy which examined air intensive sectors. Below, we have updated the analyses undertaken in these studies using more up to date input-output tables to reaffirm this position.

2.32 In **Table 2.3**, we set out a refreshed version of the analysis undertaken by MDS Transmodal based on the 2004 UK input-output tables. Whilst this does relate to the UK, the principal findings apply equally to the States of Guernsey in illustrating the requirement for air service access by selected sectors.

Table 2.3: Sector Breakdown of the Purchases of Air Transport in the UK	
Sector	**% of air transport purchases**
Banking & finance	11.9%
Insurance & pension funds	10.0%
Air transport	9.8%
Ancillary transport services	7.9%
Postal & courier services	7.1%
Wholesale distribution	5.8%
Other business services	5.7%
Recreational services	3.4%
Motor vehicle distribution & repair, fuel	3.0%
Hotels, catering, pubs etc.	2.6%
Total	**67.1%**
Source: MDS Transmodal – 'UK Air Freight Study'	

2.33 This shows the 10 sectors that accounted for nearly two-thirds (67.1%) of the overall sector demand for air transport. Banking & Finance and Insurance & Pension Funds are shown as accounting together for over a fifth of the total demand.

2.34 In 1996, a study by Oxford Economic Forecasting 'The Contribution of the Aviation Industry to the UK Economy' analysed the proportion of the total transport inputs of economic sectors that is accounted for by aviation (including both air freight and passenger travel) and their expenditure on air transport services per employee. In **Table 2.4**, we set out a refreshed version of this analysis. These have been identified using the 2004 UK Input/Output tables and on the basis of similar criteria to those used by Oxford Economic Forecasting in their 1999 report. The list includes sectors which either spend more than 20% of their total transport budget on air travel or where spend per employee on air transport is in excess of £1,000[14]. This group has been termed 'air intensive' in that their spending patterns on air services suggest that their locations will be particularly influenced by the availability of air transport services.

[14] This has been increased from the original £500 per head used by OEF in 1999 to reflect inflation and changes in the market since the 1996 Input Output tables.

Table 2.4: Air Intensive Sectors of the UK Economy in 2004					
Sector	**% of Transport Spend**	**Spend per employee**	**Sector**	**% of Transport Spend**	**Spend per employee**
Air transport	92.5%	£7,668.59	Research & development	32.8%	£131.62
Banking & finance	68.4%	£1,305.50	Ancillary transport services	32.6%	£1,172.69
Market research, management consultancy, etc.	67.2%	£327.18	Other service activities	31.9%	£138.71
Membership organisations	65.3%	£121.70	Telecommunications	30.1%	£365.94
Other business services	63.9%	£219.26	Other transport equipment	29.7%	£944.85
Owning & dealing in real estate	61.9%	£321.20	Oil & gas extraction	28.3%	£3,740.47
Recreational services	55.9%	£310.21	Weapons & ammunition	24.1%	£214.15
Insurance & pension funds	55.8%	£3,592.28	Hotels, catering, pubs etc.	23.5%	£96.56
Aircraft & spacecraft	49.0%	£698.74	Estate agent activities	23.5%	£40.82
Postal & courier services	47.4%	£1,602.51	Iron & steel	20.7%	£1,852.17
Letting of dwellings	44.8%	£173.43	Architectural activities & technical consultancy	20.4%	£142.06
Legal activities	42.6%	£349.00	Tobacco products	19.0%	£1,757.08
Accountancy services	41.2%	£343.24	Inorganic chemicals	7.5%	£1,692.02
Advertising	40.9%	£590.77	Water transport	6.1%	£2,571.17
Computer services	40.4%	£210.25	Fertilisers	4.2%	£1,750.02
Auxiliary financial services	40.2%	£216.49	Other mining & quarrying	2.7%	£1,030.24
Source: York Aviation analysis of UK Input/Output Tables 2004					

2.35 Again, this data shows that the financial services sector accounts for a high degree of air travel usage, with air travel accounting for 68% of the Banking & Finance sector's travel demand, and 56% of the Insurance sector's demand.

2.36 In considering the risks to business of reduced air services, a number of key points were raised by consultees. Of particular importance was the fact that Guernsey competes to be a world class financial services centre, and therefore provision of air services must be on a world class basis. Although there is immediate competition from Jersey and the Isle of Man, it was highlighted that cities such as Dubai are increasingly competing to attract the same business as Guernsey, but come with true direct global connectivity. That said, the same consultees highlighted that Guernsey has the advantage of being in close proximity to London, acting as a remote, but close, facility in support of the headquarters of many of the businesses located on the Island. However, this proximity is only an advantage so long as there are reliable and frequent direct air links to London.

2.37 Within this context, consultees highlighted that an increasing amount of their business is now on the international stage and not just with London, but it is accepted that there will not be direct links to many, if any, of these global points and so a hub connection is key to being able to travel internationally. Using a hub is itself not considered to be a concern, although the quality of the onward connection from the hub to Guernsey is a concern to some consultees, who feel that access to jet services provides a better image for the Island in trying to market itself on the world stage. The issue of access to jet services was repeatedly raised, with consultees believing that without a runway extension there would be no scope for the return of such services to London[15]. We found there was a common misconception that a longer runway was necessary for the reinstatement of jet services, which we deal with further in Section 4. Interestingly, when it was highlighted that the resurfacing of the runway was adequate to see the reinstatement of jet services, most consultees moved their position from being in favour of the runway extension to not seeing the extra cost as necessary when the only thing they believe they need is jet services to London. The Guernsey International Business Association (GIBA) summed this up by saying "*..we are not sizeist, we just want jet services back*".

[15] Flybe previously operated Bae146 jets on the route until the aircraft were withdrawn from their fleet.

2.38 What was made clear throughout consultations is that many firms in the financial services sector could withdraw in a very short timescale (less than a month was quoted) if they find that air service provision does not meet their needs.

2.39 Stakeholder consultations also highlighted that some of the indigenous companies based on the Island, but operating outside of the financial services sector, are also heavily reliant on air services. The Confederation of Guernsey Industry for example highlighted that around 20% of its members are exclusively involved in international business and do not directly trade on the Island and hence rely on the air service connections.

Tourism

2.40 In relation to tourism, it would appear that there is a growing reliance on air services to support this sector and two factors in particular stand out to support this theory. Firstly, according to the Visitor Economy Strategy[16], only 37% of air departures were undertaken by non-residents in 2005, rising to 41%[17] across surveyed scheduled routes in 2008, being a higher proportion of a greater total number of air passengers as set out further in Section 3. Secondly, the average length of stay has been in decline on the Island for a number of years and in 2005 stood at around 4.36 days[18] (this includes all travellers, with stays ranging from one night upwards, and covering those visiting the Island for business purposes as well as leisure). In 2008, the figure is understood to have declined to around 4.1 days[19]. The shorter the average stay, the more likely visitors are to fly given that they will seek to minimise the percentage of their trip which is taken up travelling by sea. In 2005, 61% of visitors to the Island arrived by air, compared to 39% by sea[20].

[16] Visitor Economy Strategy, Commerce And Employment, December 2006, Page 17
[17] CAA Survey data, see Table 3.2
[18] Visitor Economy Strategy, Commerce And Employment, December 2006, Page 11
[19] Consultation with Chris Elliott of Marketing & Tourism, 11th March 2009
[20] Visitor Economy Strategy, Commerce And Employment, December 2006, Page 17

2.41 In 2007, the Hostelry industry was responsible for 6%[21] of employment on the Island, and contributed £48.2 million to the local economy[22]. However, the complex reliance on tourism for the Island means that the indirect and induced effects may be far greater, stretching into other sectors such as Retail. Furthermore, it is not clear to what extent a reduction in tourism would reduce the more general quality of life on the Island through the loss of some retail and catering facilities.

2.42 Despite the importance of tourism to the Island, there has been a decline in bed stock in recent years, Whilst we cannot say for certain that there will be further declines in the number of hotel beds available on the Island, our consultations suggest that it would seem sensible to assume that there will be no further increases, although there may be some scope for increased room occupancy, which in 2005 was around 60% across the year[23]. However, there is a conscious move to improve the quality of the hotel offer to attract higher value visitors. This has implications for the need for air services.

[21] Guernsey Facts and Figures 2008, Policy Council, Page 24
[22] Guernsey Facts and Figures 2008, Policy Council, Page 12
[23] Visitor Economy Strategy, December 2006, States of Guernsey. Serviced accommodation.

Value Connectivity Index

2.43 One quantifiable indicator of catalytic impact is to measure air service connectivity as a proxy for the extent to which the air services offered at an airport support the needs of businesses. Traditionally an airport's connectivity has been considered in terms of either the number of destinations or the number of frequencies. However, these measures are relatively crude. In terms of considering the role of an airport and the economic benefit it offers to its catchment area, these measures ignore the nature of the destinations that are served by the airport's route network. For instance, a flight to a major business city such as Paris has considerably more value to the business community than a flight to a primarily leisure destination such as Alicante. In recent years, York Aviation has developed a tool, the Value Connectivity Index (VCI), which is designed to address this issue. This analysis seeks to provide a quantitative assessment of an airport's 'offer' in terms of connectivity[24].

2.44 The VCI assesses the value to businesses of an airport's destinations based on research undertaken by the Globalisation and World City network. This research has identified a hierarchy of world cities based on the location decisions of 175 advanced service firms. A summary of the results of this research are shown in **Table 2.5**. Each city shown within this hierarchy is assigned a score of between 1 and 10 based on its ranking. Any destination not included within the list is assumed to score 0. The score for the destination is then weighted depending on the number of weekly frequencies offered to that destination.

[24] An early version of the index was used by Sir Rod Eddington in his recent Transport Study for HM Treasury in 2006

Table 2.5: Globalisation and World Cities Network Inventory of World Cities 2008
Alpha ++ World Cities
New York, London
Alpha + World Cities
Hong Kong, Paris, Singapore, Tokyo, Sydney, Beijing, Shanghai
Alpha World Cities
Milan, Madrid, Seoul, Moscow, Toronto, Brussels, Mumbai, Buenos Aires, Kuala Lumpur
Alpha – World Cities
Warsaw, Sao Paulo, Jakarta, Zurich, Mexico City, Amsterdam, Bangkok, Dublin, Taipei, Rome, Istanbul, Chicago, Lisbon, Frankfurt, Stockholm, Vienna, Budapest, Prague, Athens, Caracas, Auckland, Santiago
Beta + World Cities
Melbourne, Los Angeles, Barcelona, Johannesburg, Washington, Manila, Atlanta, Bogota, Delhi, San Francisco, Tel Aviv, Bucharest, Berlin, Helsinki, Oslo, Dubai, Geneva, Copenhagen, Riyadh, Hamburg, Cairo
Beta World Cities
Bangalore, Luxembourg, Jeddah, Munich, Kuwait, Dallas, Boston, Kiev, Lima, Miami
Beta – World Cities
Houston, Guangzhou, Düsseldorf, Sofia, Beirut, Nicosia, Karachi, Montevideo, Rio De Janeiro, Montreal, Bratislava, Nairobi, Ho Chi Minh City
Gamma + World Cities
Panama City, Chennai, Casablanca, Brisbane, Denver, Vancouver, Stuttgart, Quito, Zagreb, Guatemala City, Cape Town, Minneapolis, San Jose, Santo Domingo, Ljubljana, Seattle, Shenzhen, Manama
Gamma World Cities
Guadalajara, Antwerp, Philadelphia, Rotterdam, Perth, Lagos, Manchester, Amman, Portland, Riga, Wellington, Detroit, Guayaquil
Gamma – World Cities
Porto, St Petersburg, Edinburgh, Tallinn, San Salvador, San Diego, Port Louis, Calgary, Birmingham (UK), Almaty, Islamabad, Doha, Vilnius, Colombo
Evidence of World City Formation
High Sufficiency
Columbus, Phoenix, Cleveland, Adelaide, Tegucigalpa, Glasgow, Monterrey, Dhaka, Hyderabad, San Juan, Hanoi, Lahore, Tunis, Lyon, Leeds, Kansas City, Tampa, Pittsburgh, Orlando, Belgrade, Charlotte, Indianapolis, La Paz, Osaka, Canberra, Georgetown, Managua, Asuncion, Baltimore, Bristol, St Louis, Bologna, Accra, Nassau, Ottawa, Cologne, Lausanne, Medellin, Sacramento, San Jose, Milwaukee, Richmond, Las Vegas
Sufficiency
Christchurch, Memphis, Hamilton, Jerusalem, Krakow, Belfast, Porto Alegre, Chengdu, Nashville, Basle, Honolulu, Pune, Omaha, Raleigh, Reykjavik, Newcastle, Dar es Salaam, Macau, Valencia, Hartford, Lusaka, Durban, Curitiba, Leipzig, Aberdeen, Marseille, Baku, Cali, Dresden, Liverpool, Ankara, Penang, Salt Lake City, Muscat, Austin, Gabarone, Tianjin, Puebla, Winnipeg, Harare, Nagoya, Nanjing, Tashkent, Dalian, Southampton, Tijuana, Kaohsiung City, Tulsa, Rochester, Seville, Edmonton, Skopje, Strasbourg, Halifax, Labuan, Kingston, Birmingham, Utrecht, Genoa, Cincinnati, Johor Baharu, Tbilisi, Bremen, Nantes, Cardiff, Aarhus, Abu Dhabi, New Orleans, Chihuahua, Hanover, Queretaro, Buffalo, Quebec, Turin, Cebu, Bilbao, Libreville, Bordeaux, Poznan
Source: *"The World According to GaWC 2008"* – Globalisation and World Cities Network.

2.45 The final result of this process is a score for the airport's route network that reflects the value of its connectivity to business users that can be compared to either other airports or to the past or to future development scenarios. We have use VCI analysis to provide a comparison between the connectivity currently offered by Guernsey in relation to that offered by Jersey and the Isle of Man as the two closest competitor jurisdictions and those most likely to compete with Guernsey in attracting business from those financial service firms seeking a low tax location but wishing to be located close to London. The results of this comparison are set out in **Table 2.6**.

Table 2.6: Value Connectivity of Guernsey in Comparison to Jersey/Isle of Man, Summer 2009

Airport	Value of Connectivity	Weekly Frequencies to London
Guernsey	822	76
Isle of Man	729	56
Jersey	1120	91
Source: OAG, York Aviation		

2.46 Our analysis shows that Guernsey is in a relatively strong position, particularly compared to the Isle of Man, although it should be noted that a higher proportion of the connectivity is a result of services to London than for the two comparator cities. This suggests a greater reliance on these services and highlights the vulnerability to potential changes to the London services. In Section 5 of this report, we will consider the effects on connectivity of selected development scenarios.

Conclusion

2.47 In 2008, the Airport supported approximately 3% of the working population of the Island, either directly or through indirect and induced employment. This amounted to approximately 1.5% of the Island's GVA.

2.48 Overall, our discussions with stakeholders have highlighted the critical importance of the London link and air service connectivity overall in supporting the Island's economy, both in terms of the critical financial services sector and tourism. We explore further the implications of this dependence in the following sections.

3 MARKET ASSESSMENT

Current Position

3.1 In 2008, Guernsey Airport handled 914,000[25] passengers, and increase of 3% over 2007[26]. **Table 3.1** shows the number of terminal passengers for the Airport between 1999 and 2008, which recorded an average annual growth rate of 0.7% over the period. However, it is evident that there is no consistent pattern of growth in the number of passengers handled, with number fluctuating between 834,000 passengers and the peak of 914,000 handled in 2008.

Table 3.1: Guernsey Airport Terminal Passengers 1999-2008

Year	Terminal Passengers	% Change
1999	858,920	-
2000	884,207	3%
2001	859,188	-3%
2002	834,740	-3%
2003	861,274	3%
2004	899,945	4%
2005	866,831	-4%
2006	864,764	0%
2007	886,736	3%
2008	914,603	3%
Average % Growth Per Annum 1999-2008		0.7%

Source: CAA Statistics

[25] Terminal Passengers, i.e. those starting or ending their journey in Guernsey. A further 30,000 passengers transited Guernsey, i.e. arrived and departed on the same plane with Guernsey as a stopover on their flight.

[26] Overall passenger numbers, including transit passengers only grew by 2% due to a small reduction in transiting passengers.

3.2 Whilst the Airport handled a record number of passengers in 2008, the current weak air travel market, driven by the global economic downturn, is likely to impact on the final passenger numbers for 2009. Indeed January and February 2009 saw marked reductions in passenger numbers over the same periods a year earlier, of -5% and -13% respectively[27].

3.3 Guernsey is served by four airlines, Aurigny Air Services, Flybe, Blue Islands and following the recent launch of services, Air Southwest. Currently the route network is mainly limited to services to the neighbouring islands, the Isle of Man and mainland Great Britain. Both charter and scheduled services are, or have previously been provided, to continental Europe including Paris (scheduled) and Germany and the Netherlands (principally charter bringing inbound tourists). Some services are operated on a triangular route basis with Jersey, including Birmingham and Plymouth, typically where demand is not strong enough from either island to support a frequent direct service.

3.4 During consultations, there was concern that, whilst the Airport had previously been successful in attracting summer-only services from Germany and the Netherlands in the past, these may not return for the summer of 2009, however, these have returned with no compromise. This was another of the misunderstandings by stakeholders, which we identified, surrounding the case for a runway extension was that the European services would not be reinstated because the airlines wanted to use aircraft which are not capable of operating in to Guernsey with the current runway length. However, analysis of the Jersey Airport schedule highlights that all five weekly flights to Germany and the Netherlands over the same period would be capable of operating directly from Guernsey to their destinations, even with the current runway length and weight restrictions. This would suggest that any reduction in these services in 2009 is not directly related to the condition or length of the runway at the Airport, but instead to the wider tourism offer and overall market conditions.

[27] CAA Statistics

3.5 Within the UK, the CAA undertakes regular surveys of passengers using airports. The data collected from these surveys can be used to analyse the origins and destinations and specific characteristics of passengers in individual markets. Whilst the survey is not undertaken in the Channel Islands[28], a number of airports served from Guernsey were surveyed in 2008. Manchester, London Gatwick and London Stansted are surveyed annually, whilst in 2008 Bristol and Exeter airports were also surveyed. Using this data, we can review the nature of the traffic using Guernsey Airport. The results are set out in **Table 3.2**.

Table 3.2: Characteristics of Passengers on Surveyed Routes, 2008

Route	Outbound Business	Outbound Leisure	Inbound Business	Inbound Leisure
Bristol	0%	17%	7%	75%
Exeter	10%	25%	27%	38%
London Gatwick	18%	52%	11%	20%
Manchester	4%	39%	16%	41%
London Stansted	3%	23%	13%	60%
All Surveyed Routes	14%	45%	12%	29%
Source: CAA Survey				

3.6 As can be seen, overall 26% of passengers were travelling for business purposes on Guernsey routes, with 29% being business travellers on the Gatwick route. Overall nearly 60% of passengers were outbound to Guernsey with 29% being inbound leisure visitors, either tourists or visiting friends and relatives. The proportion of business travellers is high relative to regional airports in the UK generally and on the Gatwick route is higher than the airport-wide average for business travel of 18%[29]. The higher than average proportion of business travel has implications for the pattern of air services required to meet the needs of the Island.

[28] The States of Guernsey do undertake a visitor survey of departing passengers through the airport and ferry port, but this only covers non-residents.
[29] CAA surveys.

Reliance on London Gatwick

3.7 Through consultations and the analysis of the CAA Survey data, it is clear that Guernsey is heavily reliant upon the services to London Gatwick particularly in terms of business related air travel. Indeed, the protection of this service is cited by some proponents of the runway extension as being the key driver behind runway development; a factor which we consider further here.

3.8 The services to Gatwick by both Aurigny Air Services and Flybe support two roles. Firstly they are a link to the UK capital city, providing both business and leisure links, and secondly the services provide access to a major world hub to allow onward travel, again for both business and leisure use.

3.9 During consultations for this study, concerns were raised that over time, pressures on slots at London Gatwick may jeopardise the current level of services on this link. These concerns have been described in two ways:

- that slots will become more valuable at London Gatwick over time and smaller carriers will choose to realise the value of these slots by selling them for more lucrative operations to other airlines, with regional operations being effectively forced out of Gatwick; and/or
- concern that pricing policies at Gatwick may be altered to further favour larger aircraft and make it uneconomical to operate smaller aircraft and that any replacement larger aircraft would be unable to operate into/out of Guernsey's runway whether by existing airlines or alternative operators of larger aircraft.

3.10 The imminent sale of this London Airport by current owner (BAA) has also drawn out concerns that a new owner will want to raise income streams in order to get a suitable rate of return. However, in the alternative, the sale will increase competition in the London airport system and might lead to lower prices overall.

3.11 The concerns expressed to us are reasonable, not least as the events described follow the pattern of activity seen at London Heathrow over a number of years. The value of the slots and their use by other, particularly long haul, services has been a major driving force behind the removal of regional links (including Guernsey) from Heathrow over time. More recently the operator of Heathrow has adapted charges to encourage the removal of turbo-prop aircraft from the Airport, and this has led to the removal of some services, including the relocation of Eindhoven to London City Airport.

3.12 Should smaller regional turboprop or jet aircraft be priced out from Gatwick, either directly or indirectly via slot scarcity values, the runway at Guernsey is currently too short for the two most significant operators at Gatwick, easyJet[30] and British Airways, to operate to Guernsey as both airlines operate Airbus A319 and Boeing-737 aircraft from Gatwick which would require a runway length of a minimum of 1,700 metres, assuming they could operate with commercially viable payloads.

3.13 Despite these pressures, we believe that the concerns over slots at Gatwick may not be so significant in the short to medium term. Overall pressure for slots at the Airport has eased in the short term as a result of the relocation to London Heathrow of some transatlantic carriers, the demise of the significant leisure carrier XL Airways, the continued retrenchment of services by British Airways and the current downturn in demand for air travel more generally. In discussions, neither Flybe nor Aurigny Air Services indicated to us that pressure on slots at Gatwick was a concern to them in terms of their business prospects at Gatwick for the foreseeable future. Given the States' ownership of Aurigny, it does at least have the ability to safeguard those slots so long as the States are willing to forego any opportunity costs which might be realised from a slot sale or a price increase.

[30] We have consulted with easyJet and will consider this in more detail in Section 4.

3.14 We would concur that current market conditions probably give some breathing space in terms of any pressures to remove regional traffic from Gatwick. According to the Airport Coordination Ltd. Report[31] for Gatwick in Summer 2009, demand for slots at the Airport has dropped over the corresponding season a year earlier. Whilst these reports are a snapshot at a point in time, they provide an indication of the extent to which there is pent up demand at an airport. At the start of the Summer 2009 season, planned movements at Gatwick were anticipated to drop by 2.7%, with a drop in total seats of 4.9% and a drop in the seats per movement of 2.2% compared to Summer 2008. These figures are significant because they show a downward trend in all areas, including a move towards smaller average aircraft sizes[32], albeit this is affected by some larger long haul aircraft being moved to Heathrow.

3.15 The recent announcement by Flybe that they are opening a hub at London Gatwick should provide some comfort to Guernsey because it shows a commitment to the Airport by the airline. This will lead to Flybe having an aircraft based at the Airport for the first time, and in order to make the base work as a hub, the airline will need adequate connections to be attractive. As with the hub at Southampton, Guernsey is likely to be attractive as the airline can provide online transfers to its own network across the UK and Europe, i.e. through transfers on the same airline allowing it to broaden its sales and strengthen its position. Although we did not directly probe the airline regarding the financial performance of routes to/from Guernsey[33], it is likely that the good mix of business and leisure passengers, along with the high propensity to fly of islanders, will make the route more attractive than some other routes within the airline's network, with yields to the airline likely to be higher than some more leisure orientated routes, or routes to regional points without the strong business sectors found in Guernsey.

[31] Gatwick Airport Summer 2009 Report, ACL, 7th April 2009
[32] For the second year running as average aircraft size had decreased in Summer 2008 by 2% over the year before.
[33] Such information would typically be commercially confidential

3.16 There may also be other alternatives for maintaining connections to London, both on the basis of providing direct links, but also for accessing hub transfers. For example, services to London City Airport could be a logical alternative should non-Aurigny services be squeezed out of Gatwick. In some respects, London City might be an equally good hub for the business community of the Island given its closer location to the City of London, and the fact that onward services are directly aimed at business travellers and to business orientated destinations. Furthermore, as a hub for off-line travellers (those having to collect their bags and check-in again at a hub), London City would provide a much quicker connecting ability than Gatwick[34]. It is also interesting to note that London City has a runway which is shorter in length and with greater operating constraints than the current runway at Guernsey, with no scope for extension. All of the aircraft which can operate to London City Airport could use the runway length at Guernsey.

3.17 When considering access to London as a whole in the future, it must be recognised that some pressure for slots will be removed by the anticipated provision of additional runways to serve the City, as prescribed by the Air Transport White Paper[35]. Initially it is anticipated that the first of these will be at London Stansted, followed potentially by London Heathrow, and whilst these may not directly provide opportunities (i.e. we would not anticipate Guernsey being linked to Heathrow as the slots are more likely to be used for other services), they should relieve some pressure on Gatwick. Neither runway has yet received planning permission and cannot be taken as given. In addition, although London Gatwick is currently restricted from developing a new runway until at least 2019, and whilst the concept is not supported by the White Paper, there would be nothing legally to stop a new owner of the Airport from applying to build a new runway in the future. Whilst the BAA did not see this as their preferred strategy, the divestiture may bring the scope for this scheme as any new owner may seek to maximise their revenues in the future. This could not be assumed though and would be nothing more than speculative at this time.

[34] Due to the short times needed to collect bags and check-in at London City, which claims 5 minutes for the former and a minimum of 15 minutes for the latter.
[35] The Future of Air Transport White Paper, Department for Transport, December 2003

3.18 Although, it is not realistic to conclude that there is no risk of some smaller aircraft being priced out of London Gatwick over the medium to longer term, we cannot see this being a concern in the short term. The guarantee of slots held by Aurigny should form some comfort to those on the Island concerned about being excluded from the Airport, providing, as noted above, the States are committed to retaining ownership of the airline. As we have indicated, London City Airport may offer a reasonable alternative to Gatwick both for point to point travel and for onward connections, particularly as it will be linked ultimately to Heathrow via Crossrail providing easier global connections. A further consideration is the prospect of additional runway capacity in the London area in the longer term, easing pressure on slots. It is within this context that we consider the requirements for runway length at Guernsey.

Future Growth and Air Service Needs

3.19 Ordinarily, the growth of air services could be considered in relation to the wider growth in the economy, population and tourism product. However, the scope for growth at Guernsey is more restricted due to current and anticipated limitations on both population and hotel bed spaces. In the case of the population this is restricted by a complex set of criteria, with the main measures used to enforce this being the Housing Control Law and the Right to Work Law. Whilst this means there is no actual numerical cap, we are advised that the current population is nearing the limit[36]. In the case of the bed stock, this actually has previously had a limit to prevent the loss of spaces, imposed through planning constraints which have prevented the change of use of hotels/bed and breakfasts etc to other uses. This planning position has undergone some relaxing, although it is still not possible to freely change the use of a property away from these facilities. The overall reduction in bed spaces over recent years would suggest though that there is very little perceived growth in the market by the industry.

[36] During the inception Meeting for this project.

3.20 Given these finite limits on population and tourism, growth in demand for air travel can only realistically come from increasing trips by residents or the continuing trend for more shorter break holidays to the Island. In order to get some measure of the scope for this, we have considered the propensity to fly relative to overall population as a measure of market saturation. The propensity to fly is calculated as the number of passengers using an airport divided by the resident population within the catchment area (in this case the Island). In 2008, the propensity to fly for Guernsey was over 14 trips per resident, which is extremely high under any circumstances, Jersey by comparison is 18 and the Isle of Man is much lower at just 10 flights per head of population. This illustrates the dependence of Guernsey on air travel. Obviously this is not to say that each resident travels 14 times, as some of the air journeys are from inbound travellers, but it does show the capacity of the economy to generate air travel as a result of an economy dominated by the financial services sector and tourism.

3.21 In some respects, Guernsey has some element of a captive market, as residents are forced to fly as a result of lack of suitable alternatives; for example the ferry only operates 17 times per week[37] at variable times. This captive market may be material in terms of a willingness to pay but it must be appreciated that access to convenient and reasonably priced air services will have been a consideration for those businesses and residents who have chosen to locate on the Island such that putting up barriers, including adding to the cost, may drive residents, and consequently, businesses away. We return to this later in terms of the affordability of the runway works.

3.22 In the light of these considerations, we consider future demands on the airport in two ways; growth and the pattern of air services necessary to maintain and strengthen the Island's current economic and social position. We will consider the scope for growth first.

[37] www.condorferries.co.uk, 1st-7th June 2009

Scope for Growth

3.23 We consider the market potential for GCI in terms of the scope for introducing new routes and the scope for growth on existing services. For example, the recent launch of a new service to East Midlands[38] by Aurigny is an example of growth through the introduction of a new route. However, only if the underlying market demand is strong enough, will airlines consider launching new services.

3.24 Using the CAA survey data for 2007and 2008, we have considered the scale of onward travel to other destinations via London Gatwick and Manchester as an indication of the potential demand for the introduction of additional direct services. We have used data across two years to average out any discrepancies which may occur as a result of the relatively small sample sizes associated with Guernsey. The results can be seen below in **Table 3.3**[39].

3.25 As can be seen, some significant points are missing, such as Paris, which may be the result of the small survey size, but may also be because direct services are available from both Jersey and Southampton, providing connections which are as, or potentially more, convenient than through London Gatwick. Unfortunately, data is not available to analyse those markets. What is clear, though, is that there are no routes which have demand close enough to the levels which would be necessary to launch direct services. A single daily service with a 70-seat aircraft would require approximately 36,000 annual passengers to be sustainable year round, and even allowing for some stimulation of the market, there is no route which is close enough to this target level of traffic.

3.26 It therefore seems sensible to assume that, although there may be some limited new destinations, future growth will primarily be on existing routes. As highlighted in Table 3.1, the Island has generated annual growth of around 0.7% per annum over the period 2001 – 2008, against a backdrop of declining hotel bed stock and a relatively static population.

[38] New services such as this will often stimulate some element of the market as well as divert some passengers from existing services such as those to Birmingham, so not all of the capacity will be taken up by new growth.
[39] We have excluded very small markets with demand less than 2,000 passengers per annum

3.27 However, whilst there may be scope for increased use of the leisure accommodation available, this may be offset with a lower level of growth, and in some areas, decline in business travel. Through a study undertaken by ourselves on behalf of the City of London Corporation[40], it was highlighted by many firms in the financial and business service sectors that they are aiming to gradually reduce their need to travel on business and seek alternatives through technological developments, particularly where travel is for internal company purposes and not directly linked to clients. This was also mentioned to us as a factor during consultations with business organisations on the Island.

[40] Aviation Services and the City, July 2008, York Aviation LLP

Table 3.3: Average Annual Demand to/from Onward Points via Hubs	
Origin/Destination	**Demand**
Faro	2,179
Orlando (SFB)	2,188
Fuerteventura	2,308
Singapore	2,391
Lanzarote	2,434
Innsbruck	2,544
Dalaman	2,713
Barcelona	2,789
Copenhagen	2,807
Valencia	3,073
Verona	3,183
Zurich	3,274
Cape Town	3,582
Madrid	3,820
St Petersburg	3,897
Mumbai	4,133
Tenerife (TFS)	4,341
Las Palmas	4,502
Dubai	4,545
Pisa	5,242
Belfast (BHD)	5,670
Heraklion	6,232
Edinburgh	6,636
Malaga	7,067
Glasgow	7,508
Prague	8,003
Funchal	9,444
Geneva	9,719
Amsterdam	10,655
Alicante	11,141
Riga	11,416
Dublin	11,853
Source: CAA Survey 2007 and 2008	

3.28 Taking these features of the market into account, it seems sensible to be prudent about projecting substantial market growth at GCI. During discussions with the airlines and airport management, the overarching view was that there was limited opportunity to increase the overall size of the market due to the constraining factors. For the purpose of our analysis of the business case for extending the runway, we have assumed that the average growth in air travel will match that which has been seen historically at around 0.7% per annum. A lift in the population, or a significant increase in hotel bed capacity could lead to further growth, but we have not assumed that either will take place in the short to medium term in undertaking our analysis.

3.29 Based on the growth rate set out above, **Table 3.4** shows the forecast passenger demand for selected years to 2030. Given the current rapid decline in demand, resulting from the wider downturn in the market, we have allowed of a decrease of 2% in 2009 and static traffic in 2010 before the growth of 0.7% is applied. We consider this to be a reasonable basis for considering the benefits of extending the length of runway at GCI. In other words, the case for the runway extension has to be predicated on improving or securing the quality of the air service offer to Guernsey rather than providing a platform for growth.

Table 3.4: Passenger Forecasts for Guernsey Airport for Selected Years

Year	Passengers
2015	930,000
2020	960,000
2025	995,000
2030	1,030,000
Source: York Aviation	

Pattern of Air Service Needs

3.30 It is clear from our consultations that the continued provision of air services, and, in particular, strong links to London are essential to retain the valuable financial and business service sectors. It is also clear that air services are essential to support tourism, and has become the established way of accessing the Island for many. Given the shift in the tourism product towards higher end short break holidays, air services are particularly crucial to supporting this sector of the market.

3.31 During consultations with the business community there were seven key themes which emerged over air service needs:

- the priority is to maintain **direct services to London Gatwick** to provide access to London and an international hub;
- **frequency** is extremely important to maximise business flexibility;
- flight times must be such that **convenient day trips to/from London** can be achieved with sensible working days in the City and on the Island;
- whilst air fares are important, business would often rather pay higher fares than take lower fares on low frequency, high volume services which do not provide for day return business trips;
- there is **little real appetite for significant services to new points**, particularly internationally, with acceptance that links via a hub are adequate;
- having to connect to services to London and the UK mainland via Jersey would be wholly unacceptable;
- that any significant drop in air service provision within the requirements above would lead to a rapid withdrawal of some firms from the Island.

3.32 As has already been highlighted, the business community is very keen to see the return of jet services, previously operated by Flybe, on the London Gatwick route. This could be achieved from the existing runway length using Flybe's Embraer 195 aircraft, offering around 118 seats[41]. As we discuss in the next section, the issue for these aircraft is runway strength rather than runway length. In any event, given the scale of demand, and our view that there is unlikely to be substantial growth without an uplift in the population and tourism offer, it would appear that smaller aircraft operated at high frequency, as at present, would offer the best opportunities for supporting the needs of the business community. If substantially larger aircraft are operated (150 seats or more), the airlines will still need to achieve a viable load factor[42], which would result in lower frequencies of service being offered unless the market shows substantial scope for stimulated growth, as seems unlikely. Hence, a switch to operations by larger aircraft could potentially jeopardise the flight times and convenience for business.

3.33 As can be seen from our analysis of the market earlier in this section, demand to/from Guernsey is a mix of business and leisure traffic, notwithstanding the relatively high proportion of business travel. However, airlines need to serve both markets with a single service as the overall market size does not warrant a differentiated offer. However, in relation to the inbound tourism market, in particular, the air service needs are less clear. During consultations the following points were raised:

- many visitors decide on destination based on **where they can fly to conveniently from their most local airport**, especially for short breaks;
- the **price of the air fare is important** in decision making, as visitors would rather spend more on the Island than on accessing the Island;

[41] It should be noted that an immediate switch back to jets may not be achieved following the runway works (whether extended or not) as Flybe stated that they incurred substantial costs in training crews based at Guernsey on their Embraer 195 jets in anticipation of using them on the Gatwick route before issues with the runway pavement strength became apparent. They incurred the cost of retraining the crews back to the Dash-8-Q400 aircraft and may be reluctant in the short term to incur further retraining costs

[42] The load factor is the % of seats sold on each flight. Increasingly low fares airlines operate to a target load factor and rely on ancillary sales rather than a target air fare or revenue per flight

- ✈ **direct access from European points** would be beneficial in reducing the dependency on the UK market.

3.34 It was recognised by consultees that, overall, the Guernsey market was unlikely to be suitable for the higher capacity, low fares airlines, such as easyJet and Ryanair, because the Island does not have the bed capacity to handle bulk arrivals of passengers on a regular basis. Nonetheless, we are aware that easyJet has considered whether operations would be feasible Furthermore, the tourism organisations recognised that for such routes to be successful there would also need to be a volume flow of outbound traffic and that the home market may not be adequate to support services by such airlines for outbound and business travel. Nonetheless, in the context of the Gatwick route, there were some who believed that a lower frequency service with a larger aircraft would be better than losing services altogether.

3.35 The Guernsey Hospitality and Tourism Group highlighted that the package holiday market still financially underpins some hotels on the Island, and concern was expressed that if the airport infrastructure was a barrier to attracting airlines then some tour operators may pull out of Guernsey over time. Some consultees attributed the reduction in services from Germany to constraints on runway length but our analysis suggests this is not the case as the aircraft operating the equivalent services to Jersey are all capable of operating at Guernsey at present and could reach all of the destinations served. Our discussions with Flybe, who actively participate in providing flights as part of package deals, suggested an alternative explanation, namely that an increasing number of the hotels on the Island are not willing to sell beds through packages in the peak summer months of July and August. This impacts on the tour operators as they cannot provide a full season programme, especially to foreign travellers who are more likely to book through a tour operator.

3.36 Given the dynamics of the market and the aspiration to improve the quality of the tourism product, recognising the overall constraint on the number of bed spaces, it may well be that the objectives of tourism authorities can also continue to be met best by the use of smaller aircraft on services to the Island. If a longer runway were provided then it would open the opportunity for airlines with larger aircraft to commence services, probably from London. The arrival of large aircraft could have the effect of crowding out other flights as the finite amount of bed space on the Island would quickly be taken up. This could have the effect of reducing the range of points served overall if loss of tourist traffic resulted in regional services ceasing to be viable. Whilst, in overall economic terms, it should not matter where the tourists arrive from, so long as they come, in truth this is not the case. The tourism groups would like to see more diversification in where tourists arrive from, and on the basis that passengers wish to fly from their local airports, then offering more seats from a smaller number of airports will expose the Island's tourism product to greater reliance on a small number of origin points. This would have been less of a concern when the tourism product was dominated by returning travellers (on an annual basis), but with the move towards short breaks and discretionary decision making, it is important that passengers across all the regions can access services from their local airport. A reduction in the number of points served would, hence, reduce the market available from which to attract visitors to Guernsey.

3.37 Potentially, using larger aircraft would bring advantages from lower air fares, but this is not necessarily the case as we will demonstrate in Section 5. In practice, fares with Flybe are often comparable to those offered by easyJet, and truly low fares are often only achieved when Ryanair enters a market. Even with a runway extension, this is unlikely to happen as the achievable runway length would still fall short of this airline's minimum operating lengths. It needs to born in mind that a number of airlines operate a lower fares model with smaller aircraft, such as Dash-8-Q400s and smaller Embraer aircraft, similar to Flybe, and these could operate to Guernsey.

3.38 A further consideration is the pattern of air services required to meet the needs of islanders as residents and for social reasons. As outlined in Section 2, making the Island attractive as a place to live is essential in order to ensure skilled labour can be attracted to support the business community. With this in mind, during consultations with the business community, the requirements for personal travel were also explored. The key point, which was repeatedly raised, relates to air fares between the Island and the UK, although the views on this were mixed. Some consultees felt that air fares were unnecessarily high for leisure travellers and that the best deals were taken very quickly when tickets were released to the market. On the other hand, some consultees felt that, in real terms, the price of air fares had fallen compared to the fares previously seen when British Airways and British European (now Flybe) dominated the schedules. As highlighted in Section 5, even with a longer runway at Jersey, 7 out of 12 sampled route/booking periods are cheaper from Guernsey than the equivalent options from Jersey.

3.39 As with the tourism sector, the personal travel needs of residents may also be affected if larger aircraft are able to access the Island because demand will not rise concurrently, and therefore the list of destinations may actually reduce. There is a tension, therefore, between lower fares and the range and frequency of destinations available. These need to be considered in terms of the strategic fit with the overarching social and economic priorities for the Bailiwick.

3.40 Services from Jersey to Manchester are a good example of how the quality of air service offer may be affected by the ability to attract services by larger aircraft. Manchester is served by both Flybe and bmibaby, with the latter operating a daily service with a Boeing-737 aircraft offering twice the capacity of the Flybe aircraft, and Flybe operating once daily in each direction on weekdays, giving two return flights per day in total, but with capacity equivalent to three smaller aircraft per day. The Flybe aircraft arrives from Manchester in the morning and operates from Jersey to other points before returning to Manchester in the evening and the bmibaby service operates around the middle part of the day on most days. As a consequence, it is not possible for Jersey based travellers to do a day return business trip to Manchester. This reflects the tendency of low fare airlines to deploy aircraft so as to maximise revenue. Short sectors within the British Isles are often used to fill in the schedule during the middle of the day between more profitable operations to more distant points, as many of the routes from UK regional points to Jersey illustrate. In the case of Jersey, without the bmibaby operation, it is more likely that Flybe or another airline would have operated services facilitating day return trips in both directions, similar to the pattern operated by Aurigny from Guernsey to Manchester. There is a real risk that attracting a high volume, low fares operator would result in a lower frequency of service, less convenient for business travellers, albeit providing the same number of seats overall. This would be viewed negatively by business users and would reduce convenience for Island residents.

3.41 Whereas the scale of the Jersey market allows a wider portfolio of routes to be maintained, a shift to higher capacity low fares operations would have a more damaging impact on the network from Guernsey. Reductions in flight frequency would impact directly on business travellers, resulting in increased costs and lost productivity if day return business trips had to be replaced by overnight stays.

3.42 To illustrate the problem, if smaller aircraft were removed from London Gatwick and a low fares carrier launched operations on the route then the following pattern of operations may occur:

- low fares carriers do not overnight aircraft away from their bases in order to avoid accommodation costs and so the aircraft will be based in London overnight, not Guernsey, which at best would mean no early departure to London, with the probable earliest departure to London being around 8.30am, arriving at around 9.30am; but

- a low fares airline may be unlikely to use its early morning slots for a service to Guernsey, instead choosing to use them for a higher value business destination, such as Paris, Zurich or Frankfurt, resulting in a first departure to London from Guernsey around 11.30am with an arrival at around 12.30; and

- the capacity associated with the current 10/11 frequencies per day could be matched by only 4 or 5 with a larger aircraft and these are likely to be at less convenient times of the day due to the need to maximise aircraft use on longer sectors. This would remove the advantages of frequency and flexibility.

3.43 The implications of an operation of this nature on the London route are clear and would be wholly unacceptable to business passengers. Such flight times would also make connecting to other destinations more difficult by limiting the number of onward connections, many of which would have departed by the time an aircraft arrived from Guernsey. Such a change in operating pattern may be expected to lead to some loss of businesses in the financial and insurance sectors from the Island.

3.44 In this context, we note that very few of those consulted who are in support of a runway extension actively justify their preference based on wishing to attract low fares airlines at this stage. Rather, they are concerned that the changing the airline market and developments in aircraft technology will mean that a longer runway is necessary to secure future operations at all. Although, as we will explain in the next section, we do not consider this to be likely in the short to medium term, services by larger aircraft may be the only options in the longer term.

Comparisons and Links with Jersey

3.45 Our consultations have highlighted an aspiration to achieve the level of air service connectivity currently seen on Jersey. Furthermore, it was suggested that Guernsey could benefit from additional services by combining flights on a triangular basis with Jersey operations. Where concerns have been raised is the number of operations at Jersey which currently could not operate on a triangular basis because Guernsey's runway is too short for the aircraft already on these routes. We consider each of these points in turn.

3.46 In the first instance, we note that Jersey has a larger population than Guernsey (90,800[43]) and also a stronger, more developed tourism product, both in terms of number of bed spaces available (13,050[44] bed spaces) and facilities on the Island, such as a zoo and leisure parks. This creates a greater critical mass on Jersey, which is able to support a wider range of airlines and aircraft types than may be required to best serve the needs of Guernsey. The propensity to fly for Jersey is nearly 17.9 flights per head of population compared to the figure of 14.8 for Guernsey. The distinction between the two markets was recognised by our consultees. Our analysis suggests that, in reality, there are few additional routes which would be independently viable from Guernsey.

3.47 Whilst triangular routes may offer the ability to open up new smaller markets, it is clear from discussions with airlines that they view triangular routes as last resort to combine markets which are not strong enough to sustain services from a single point. Although some triangular routes are currently operated, Flybe highlighted that the flight leg between Jersey and Guernsey is essentially a dead-leg, which costs them money to operate and may contribute to higher air fares. Furthermore, it only makes sense to combine a route between the two islands when demand from neither is sufficient to warrant a service.

[43] Estimated at December 2007, Jersey in Figures, 2008, www.gov.je
[44] 2007 Figure, Jersey in Figures, 2008, www.gov.je

3.48 In terms of the overall range of operations from the two islands, our analysis suggests that, in June 2009, only 21% of onward connections from Jersey are currently operated using aircraft which are not able to use the runway length at Guernsey[45]. Highlighting, again, that runway length is not a short term constraint on the range of operations from Guernsey.

Access to a Hub

3.49 A report produced by ASM[46] highlights a further consideration, namely access to hubs to provide alternative global connecting links, such as Paris, Frankfurt, Amsterdam as well as London. It highlights that demand for slots at these airports could lead to runway usage equivalent to that seen at London Heathrow, with the consequent squeezing out of smaller aircraft. Our assessment would suggest that demand to these points is relatively limited; a view also shared by stakeholders. In any event, the hub carriers at these European points continue to have regional feeder carriers which could provide connections to Guernsey if the market warrants. In particular, Air France/KLM are focussed on developing their hubs at Paris and Amsterdam as major regional connecting points and we do not see small feeder aircraft being squeezed out in the short to medium term as this would cut across broader strategies.

3.50 ASM also highlight the potential for other hubs in Europe such as Munich, Vienna or Munich, but these hubs appear to be less relevant given the focus of onward connections by Guernsey travellers today, as set out in Table 3.3. We consider that the current Air Berlin operation to Jersey from German points, using Dash-8-Q400, demonstrates the scope for operations direct to key European points, including secondary hubs, from the existing runway length at Guernsey.

Conclusion

3.51 In this section, we have considered the market for air services to/from Guernsey. Within the context of limits on population and constraints on the tourism market, by way of bed spaces, the scope for growth in passengers using the airport is limited.

[45] ASM's assessment of 42% of capacity referred to seats offered not flight frequencies.
[46] Consolidated comments on Guernsey Runway Proposal,

3.52 We have considered the potential requirement for larger aircraft to serve the market in the light of changes in the industry and/or constraints on capacity pushing smaller aircraft out of congested airports. In the light of the limited size of the market, our analysis has highlighted a tension between the requirements of the business community for high frequency, appropriately timed services, and the requirement more generally for routes to a range of UK and European points and the drive to larger aircraft and lower fares. Our assessment is that the market will be better served for the time being by higher frequency services by smaller aircraft.

3.53 In the longer term, changes in the airline market may lead to a requirement to introduce larger aircraft but we do not consider that there is a market imperative for the foreseeable future.

4 DEVELOPMENT OPTIONS

The Need for Development

4.1 At the current time, the runway, taxiways and apron areas of Guernsey Airport are in urgent need of refurbishment due to surface and pavement strength degradation which has occurred over the time since the last major refurbishment of the runway 30 years ago. Whilst reviewing the works necessary to bring the facilities back to the required standard, the airport management and Public Services Department (PSD) also assessed that the works were likely to trigger a requirement by the UK CAA to make changes to the Runway End Safety Areas (RESA's) at each end of the runway. Our experience of similar runway development and refurbishment works is that such works to a runway would normally trigger a requirement by the CAA to provide RESAs to the current standards.

4.2 Although we recognise that the UK CAA has no statutory decision making powers in relation to Guernsey, it is widely accepted that their continued assessments of Guernsey Airport and any recommendations from such assessments will be adhered to by the new Director of Civil Aviation (DCA) for Guernsey. Therefore, in this section, we refer to the requirements of the CAA on the assumption that the DCA will follow guidance from the UK regulator.

4.3 The runway/taxiway condition is such that, at present, the Airport has placed some restrictions on the types of aircraft which can operate. In some cases, this does not preclude an aircraft's use, but does mean that an aircraft cannot operate at a full payload, which impacts on the economic efficiency of operations. For example, Flybe's new Embraer 195 jets could be operated with the length of runway available but are payload restricted to prevent the undercarriage doing further damage to the runway pavement. These operating restrictions give rise to a perception that the runway length is the issue but Flybe has confirmed that the aircraft type will be able to operate from Guernsey's runway length in all conditions if the pavement strength was adequate. We consider aircraft operational issues later in this section.

4.4 Over and above the urgent need to strengthen the runway pavement, the other key requirement is to bring the RESA's inline with current standards, as set out by both CAP 168[47] and ICAO Annexe 14[48]. CAP 168, against which the Airport will be assessed, has a requirement for a minimum of a 90m RESA based on the physical runway length and existing conditions. However, CAP 168 states:

"*Licensees should not assume that the minimum distance of RESA will necessarily be sufficient, particularly where there have been changes to the environment on or around the aerodrome, or to the type or level of traffic; it is recommended that RESAs extend to at least 240 m for code 3 and 4, and up to at least 120 m for code 1 and 2 instrument runways, wherever practicable and reasonable. Therefore, as part of their system for the management of safety, licensees should review and determine on an annual basis the RESA distance required for individual circumstance[49]….*"

4.5 With a Code 3 runway, Guernsey is required to provide RESA's towards the 240m requirement triggered by works being undertaken to the runway, although there may be some scope for some derogation from the full provision, subject to approval by the CAA and on the basis of a number of factors, including:

- the nature and location of any hazard beyond the runway end;
- the type of aircraft and level of traffic at the aerodrome, and the actual or proposed changes to either;
- aerodrome overrun history;
- overrun causal factors;
- friction and drainage characteristics of the runway;
- navigation aids available;
- scope for procedural risk mitigation measures; and

[47] CAP168: Licensing of Aerodromes, Civil Aviation Authority (CAA)
[48] International Standards and Recommended Practices: Aerodromes, International Civil Aviation Organisation (ICAO)
[49] CAP 168 Licensing of Aerodromes, Chapter 3, Page 10, *CAA*

- ✈ the net overall effect on safety of any proposed changes, including reduction of declared distances.

4.6 A variety of RESA lengths have been examined by PSD's consultant engineers under various development options. There are clearly environmental impacts associated with the RESA developments at Guernsey Airport, including visual intrusion and noise impacts. There are also cost implications for such development as the requirement to infill land in a significant way at both ends of the runway to develop RESA's adds significant cost to any development scheme. As a consequence, options have been considered to provide RESAs of less than 240m, taking into account the difficulty and impacts of the full provision. This could be justified on the basis of the generally smaller size of aircraft which use GCI's 1,463m long runway compared to the capability of a longer Code 3 runway.

4.7 However, with reduced RESA provision, there is a risk that the Director of Civil Aviation, under guidance from the CAA, may require the provision of fully compliant facilities at a later stage, and potentially, at that time, the minimum requirement may be for more than 240m. Hence, providing a 240m RESA now would, to a large extent, 'future proof' the Airport, because once an airport is compliant, it is unlikely to be required to move to a higher standard until such times as further major works/runway development etc is required. Our understanding is that priority has been given to ensuring that the western end of the runway is fully compliant so as to limit the scope for RESA lengths becoming an issue at a later date.

Development Options

4.8 Currently, the Airport has a 1,463m long Code 3 runway (Code 3 specifies the scale of the safety and graded areas surrounding a runway and sets limitations on the aircraft which can operate under each code based on factors such as wingspan and undercarriage wheel span). When considering the length of a runway it is necessary to consider the declared distances, rather than simply the length of concrete available. Comparisons between these distances are important when assessing the operational benefits provided by each runway scheme. CAP168 defines these as:

- ✈ Take-Off Run Available (TORA) – this is the length of runway available and suitable for the ground run of an aeroplane taking off;
- ✈ Accelerate Stop Distance Available (ASDA) – this is the length of TORA plus the length of any associated stopway (land at the end of the runway not including the RESA);
- ✈ Take-Off Distance Available (TODA) – this is the length of TORA plus the length of any associated clearway (obstacle free flying space over which an aircraft can climb); and
- ✈ Landing Distance Available (LDA) – this is the length of runway available and suitable for the ground landing run of an aeroplane.

Comparisons between these distances are important when assessing the operational benefits provided by each runway scheme.

4.9 The Airport appointed RPS Burks Green (formerly Burks Green) to undertake the detailed analysis and design for runway development options. In preparing this report, we have been given details of five options, although we have only considered three of these in detail. **Table 4.1** summarises the options and the 'ballpark' development costs[50] of each scheme.

4.10 Any development associated with the runway must be adequate to both secure the needs of the Island and meet the safety requirements of the Civil Aviation Authority. In particular, the latter point relates to the reconstruction of the runway, taxiways and apron as well as providing Runway End Safety Areas (RESAs) of increased length to meet the latest requirements of ICAO Annexe 14 and CAA CAP168, both of which inform the view of the Director of Civil Aviation on the continued licensing of the Airport.

[50] These figures were provided as 'ballpark' costs to allow the Cost Benefit Analysis to be undertaken. They should NOT be taken as accurate and may be subject to change.

Table 4.1: Runway Development Options Summary

Option	Description	Runway	TORA (metres)	TODA (metres)	LDA (metres)	Development Cost*
Current	Current	9	1,463	1,601	1,458	
		27	1,462	1,639	1,458	-
A	Resurface the runway and retain existing layout.	9	1,453	1,628	1,453	
		27	1,463	1,737	1,453	-
B	Resurface runway and develop full 240m RESA at western end, but no RESA works at eastern end.	9	1,453	1,628	1,453	
		27	1,463	1,737	1,453	-
C (i)	Develop 240m RESA at western end, and 198m RESA at Eastern end, reposition runway and retain 1,463m of runway with starter extension on old concrete at eastern end.	9	1,463	1,721	1,463	
		27	1,587	1,748	1,463	£84,500,000
C (ii)	Develop beyond Option C (i) to provide 240m RESA at western end also and extend runway to 1,700m.	9	1,700	1,799	1,700	
		27	1,700	1,799	1,700	£127,500,000
D	Extend RESA's to 135m at both ends, retained in current airport boundary, thereby reducing runway length to 1,385m.	9	1,463	1,671	1,385	
		27	1,463	1,726	1,385	-
E	Provide equal RESA's of 202m at both ends, retain 1,463m runway with starter extension on old concrete at eastern end.	9	1,463	1,725	1,463	
		27	1,587	1,743	1,463	£83,500,000

Notes:
Schemes C (i) and E provide similar runway distances but, due to construction methodologies associated with providing the RESA's, it would be more difficult to construct a longer runway in future from Option E.

* Ballpark figures only for CBA assessment. These figures are subject to change during detailed costing calculations.

Source: RPS Burks Green, Guernsey Airport, York Aviation

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4.11 Early studies undertaken by RPS Burks Green considered the option of upgrading the runway from a Code 3 category to a Code 4 category if a runway extension was provided. This would essentially have required further extensive re-grading work on the runway vertical profile and an upgrade to the areas surrounding the runway to improve safety for the operation of larger aircraft. Given that the maximum TODA which could be provided is 1,799m with Code 3 and Code 4 could only have accommodated a relatively small increase in the TODA for significant additional cost, the option for a Code 4 runway was discounted. The options which we considered did not include this requirement.

4.12 We present plans for the three primary schemes in **Appendix B**. Option A does not provide longer RESAs and is based on the premise that if the runway is simply refurbished and not lengthened, longer RESAs would not be required. However, if the intention is to attract jets back to the Airport once the runway is refurbished, we do not believe this option would be acceptable to the CAA. There is a high risk with this option that the CAA would seek either a reduction in the declared distances, or some significant limitations on aircraft size and operating procedures which would jeopardise the adequate provision of air services to the Island. In the same light, we take the view that Option B may be subject to similar restrictions, which could lead to an unacceptable withdrawal of scheduled services.

4.13 Option D is physically similar to A, but accepts immediately that the lack of longer RESAs will lead to a reduction in the runway declared distances. This option improves the RESA lengths provided within the current Airport boundary to minimise the impact on the local area surrounding the Airport. Whilst we understand the planning and environmental logic behind this proposal, it would restrict the aircraft types which could use the Airport and would almost certainly prevent the reinstatement of jet services by Flybe. Furthermore, with RESAs well below the standard, the CAA may seek to limit the types of aircraft which could operate, and may exclude jet services altogether, even those which could use a 1,385m runway landing distance.

4.14 Options C (i and ii) and Option E have been proposed as the most likely options by the PSD. We, hence, focus on these in the remainder of this report. Option C (i) represents is a development which secures the existing declared distances and provides RESAs which are expected to be adequate for the CAA. A full 240m RESA will be provided at the western end, which will be fully compliant with current rules. This is expected to be a 'final' position as, even if further developments are made to the runway, the RESA should be sufficient giving a settled position for residents to the west. The provision of a marginally shorter RESA at the eastern end under this scheme may be accepted by the CAA on the basis that the scheme will permit further development works at this end of the runway in the future if an extension to the runway is deemed to be needed. We understand that preliminary discussions with the CAA suggest that, because of the fleet mix using the Airport, the shorter eastern end RESA is likely to be accepted under the variances described earlier in this section and subject to the provision of a full safety case.

4.15 Option C (i) is purposefully designed on the basis that it would take minimal construction efforts to extend the runway to 1,700m, either as an immediate continuation of the works once the runway has been resurfaced or at a later date if it is deemed that the extension is not required at this time. As a further development, Option C (ii) would bring a full extension to 1,700m along with full RESAs at both ends[51]. In addition, the TODA for this scheme would be 1,799m, which matches the limits of a Code 3 runway, so going beyond this scheme would also give rise to substantial additional costs to upgrade all facilities to Code 4 for very little gain in terms of economically viable air services.

4.16 Option E was developed for following requests by some members of the States for a lower cost scheme, which delivered equal RESA lengths at each end of the runway within the existing airport boundary. Essentially this would provide the same declared distances as Option C (i) but with the runway area slightly repositioned to give equal RESAs at both ends. It has been considered that the CAA may accept this as a long term solution if there is no prospect of subsequent extension of the runway. However, from the information provided to us by RPS Burks Green, the cost savings associated with this scheme would not be significant.

[51] Many consultees believed that the runway length of 1,700m was chosen to match the length of the Jersey runway whereas it represents the physical limit, including full RESAs, of what could be provided based on the topography and obstacles on the Island.

4.17 Although similar in terms of what they deliver today, the difference between Options C (i) and E results in different costs associated with increasing the runway length to 1,700m with fully compliant RESAs as a later phase or at a later date. Option C (i) has been designed as a stepping stone towards the implementation of a longer runway, the site can be left in such a way that the additional profiling of land to the east and the additional runway length can be provided at a lower cost of £43m[52]. Under Option E, not only would land works need to be undertaken at the eastern end, but also the runway would need to be repositioned to achieve the full RESA at the western end, giving a total additional cost of £48m.

4.18 Overall, Option E gives a marginal cost saving but would make a future runway extension more costly. This is a factor to be considered in assessing the appropriate development option.

Runway Capability

4.19 We will now go on to consider what each runway length under Options C (i)/E and C (ii) would provide in terms of aircraft capabilities. As highlighted earlier in this section, each of the declared distances plays a different role in an aircraft's ability to operate. Whilst each aircraft type will typically have a critical declared distance, usually either the TORA or LDA, even if that criteria is met then one of the other criteria may prevent an aircraft from operating. The main example here relates to the TORA and TODA because, providing the clearway is long enough for the TODA, some aircraft will be able to operate from shorter TORAs than would at first be anticipated.

[52] All costing are 'ballpark' figures supplied only for the purposed of CBA assessment. These figures are subject to change during detailed costing calculations.

4.20 In considering the capability of the runway options, we have taken account of a number of studies which have been undertaken concerning the capability of the GCI runway over the period since 2001. However, many of these studies have considered the runway length required by selected aircraft based on aircraft being able to take-off and land at their maximum permissible weights. This has presented an unrealistically negative view on the aircraft types which could use the GCI runway at a particular length as the amount of fuel carried is a function of the sector length of the flight[53]. Based on our assessment of the market, all of the potentially viable routes do not require aircraft to operate at maximum take off or landing weights, so reducing the length of runway required. In **Table 4.2**, we set out the range of selected aircraft with their maximum passenger without runway restrictions. In **Table 4.3**, we set out the distances from Guernsey to a number of key destinations.

4.21 Comparing the information in these two tables, it is clear that many aircraft only require a fraction of their maximum fuel when departing Guernsey. Essentially some of the aircraft shown in Table 4.2 are capable of operating well into Africa and the near-East from longer runways and so with Guernsey only needing them to operate to points in the UK and perhaps near Europe, these aircraft can reduce their fuel uplift substantially.

Table 4.2: Range of Selected Aircraft with Maximum Payload

Aircraft	Range (km)
Dash 8-Q300	870
Dash 8-Q400	2,401*
Canadair C100	2,200
Embraer E170	1,800
Embraer E175	3,334
Embraer E190	4,260
Embraer E195	3,889
ATR-42-500	1,556
ATR-72-500	1,648
Notes: * Range with max fuel	
Source: www.rati.com	

[53] It is not economic for airlines to carry more fuel than required because of the cost of carriage

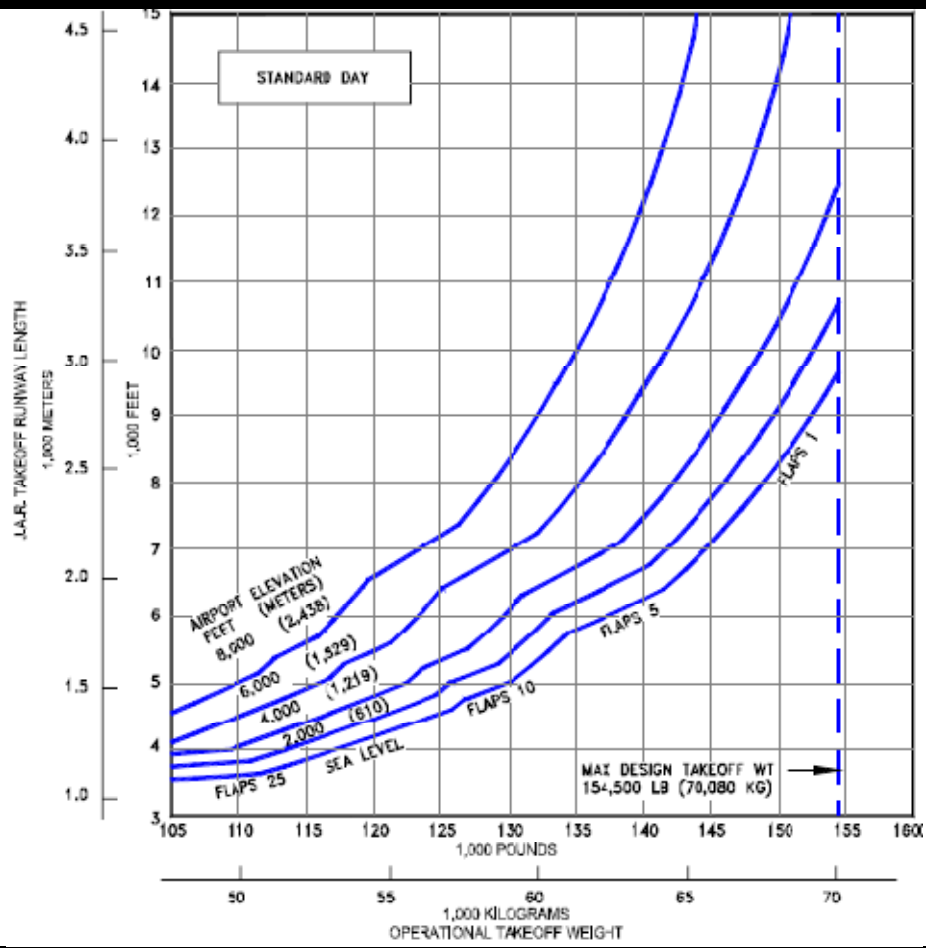
Table 4.3: Flying Distance from Guernsey to Selected Destinations	
Destination	**Distance (Km)**
Manchester	436
London Gatwick	256
London City	296
Birmingham	342
Edinburgh	727
Amsterdam	605
Paris CDG	375
Dublin	511
Frankfurt	803
Zurich	848
Please note, these distances are direct only and do not include any allowance for holding in-flight before landing	
Source: OAG	

4.22 We illustrate the balance between runway length and range in **Figure 4.1** using a runway performance chart for a Boeing-737-700 aircraft. This shows how the required runway length increases as the take-off weight of the aircraft increases.

4.23 The misunderstanding about runway length capability is illustrated by a report produced for the Chamber of Commerce in 2001[54] in response to a report by Halcrow[55] undertaken for the States of Guernsey. This report did not take into account the requirement for aircraft to operate below maximum weight. This report suggested that, based on wet conditions and the existing runway length, the Dash-8-Q400 could not operate into/out of Guernsey, similarly the Airbus A319 and A320 aircraft should not be able to operate into/out of Jersey. This is clearly not valid as these types continue to operate year round.

[54] The Chamcrow Report, Guernsey Chamber of Commerce, 13th June 2001
[55] Guernsey Airport Runway Extension Study – Aviation Industry Consultation, Final Report, Halcrow, April 2001

Figure 4.1: Take-Off Field Performance for Boeing-737-700, Wet Runway



Source: Boeing

4.24 In terms of required runway length, a further example is to consider operations at London City Airport, which has a substantially shorter runway than Guernsey. As an illustration, **Table 4.4** shows the current runway declared distances of Guernsey, along with the Option C (i) distances, and those at Jersey and London City.

Table 4.4: Runway Length Comparisons					
			metres		
Airport	**Runway**	**Runway Dimension**	**TORA**	**TODA**	**LDA**
Guernsey Current	9	1,463x45	1,463	1,601	1,458
	27	1,463x45	1,462	1,639	1,458
Guernsey Opt C (i)	9	1,463x45	1,463	1,737	1,453
	27	1,463x45	1,463	1,721	1,463
Jersey	9	1,706x46	1,706	1,889	1,646
	27	1,706x46	1,646	2,469	1,555
London City	10	1,508x30	1,199	1,319	1,319
	28	1,508x30	1,199	1,385	1,319
Source: RPS Burks Green, NATS AIS, York Aviation					

4.25 Although London City has a greater length of concrete, the declared distances are substantially less than those of Guernsey due to obstacles presented by buildings at Canary Wharf. Despite this, there are direct services to points as far away as Stockholm, Rome and Madrid. Whilst many of the operations at this airport are by BAe-146/Avro RJ aircraft, with extremely good runway performance, over time these aircraft will be replaced by the more modern jets, mainly in the form of Embraer 170/190s and Canadair C100/300[56] aircraft indicating that there will continue to be a range of aircraft types which could use the existing length of runway at GCI.

4.26 In assessing the 1,700m option, this would undoubtedly provide the capability for the Airport to handle Airbus A320 and Boeing-737 families of aircraft, although with some range restrictions in some cases and with some variations between airlines due to their different operating rules. Whilst this runway length is adequate to attract services by easyJet (given their operations at Jersey), it would not be adequate for Ryanair's Boeing-737-800 fleet, require more than 1,800m as a minimum.

[56] It is not yet clear whether the larger C-300 aircraft will be able to operate from London City, but at the very least, the C-100 will be guaranteed as capable as the launch customer has ordered the aircraft specifically fro services to the London Airport.

4.27 Our assessment of the market in Section 3 suggests that, for as long as suitable aircraft are available, the current runway length is adequate to deliver the best mix of services for Guernsey. We take as our benchmark London City Airport, which is highly valued by the airlines because of its ability to deliver high revenue earning business passengers. A number of major airlines are committed to serving the Airport and are basing fleet decisions on securing aircraft which can operate on the restricted runway length. Aircraft manufacturers are, hence, committed to delivering aircraft capable of operating to/from London City and with payloads of 100 passengers or more. Such aircraft would also be available to operate from Guernsey.

4.28 Such new aircraft may reasonably have an operating life of 20 years. Consequently, new aircraft entering service now will still be around for some time. Many of these aircraft types, such as the Embraer e-jets or the Canadair C-series of aircraft (100 and 300), are still in their relative infancy and, in some cases, not yet in operation and will be in production for some time to come, perhaps 10 years of more. Hence, there will continue to be aircraft capable of operating into Guernsey on its current runway length in 30 years time.

4.29 Guernsey also benefits from being able to handle a number of aircraft types which cannot operate into London City, including the Embraer 175 and Embraer 195. Perversely, the development of larger twin engined regional jets has played in favour of Guernsey. The original smaller 50 seat regional jets had lower thrust engines and did not have adequate range to cut out such a high percentage of their fuel load. The newer, larger jets have a higher ratio of thrust to weight and can cut out a substantial amount of fuel uptake when only operating on short sectors. Some of these new regional jets are similar in size to the smallest aircraft in the mainline fleets. Consequently, even if 50-70 seat turboprops are priced out of the market at hubs, it should still be possible to justify operations with aircraft seating between 100-130 passengers.

4.30 In the turboprop market, Bombardier are actively considering options to stretch the Dash-8-Q400 from a 78-seater to a 90-seater, supported by airlines such as Flybe. Whilst this project has not yet been firmed up, it does illustrate that demand for regional aircraft still exists, and in particular for larger regional aircraft which can deliver better economics than the 50-seat aircraft.

4.31 In **Table 4.5**, we set out a summary of newer version aircraft which are in service/on order, which could operate into and out of Guernsey with a 1,463m long runway. As can be seen from this table, there is a high volume of sales already for these aircraft types and when allowing for the fact production is likely to last for some years to come then it can be expected that further orders will arise.

4.32 Table 4.5 also illustrates some potential operators of services to Guernsey in future. We do not suggest that all of the airlines operating these aircraft would be interested in operating to Guernsey, and many of the aircraft are actually with airlines outside of Europe, but with commitments for nearly 1,700 aircraft of the type that could operate to Guernsey already, it must be remembered that these aircraft will over time become available on the used market and could pass to operators who would consider placing them into services to Guernsey. Recently, a number of Embraer E170 aircraft have entered the market for lease, illustrating the ease with which such aircraft could become available. There would appear to be adequate opportunities for airlines operating to Guernsey or potentially operating to Guernsey, including Aurigny Air Services, to acquire larger aircraft if required by operations at key destinations such as London Gatwick.

Table 4.5: GCI-capable Operational Aircraft In-Service/On Order Numbers				
Aircraft Type	**Typical Seats**	**European Aircraft**	**Worldwide Aircraft**	**European Operator Examples**
Embraer 170	70	43	182	British Airways, Regional (Air France)
Embraer 175	78	19	129	Cirrus Airlines
Embraer 190	98	70	421	British Airways, Regional (Air France), KLM Cityhopper, Lufthansa
Embraer 195	108/118	41	100	Flybe, Lufthansa
Dash8-Q400	74	132	315	Flybe, Air Berlin, Augsburg Airlines (Lufthansa)
ATR 42-500/600	48	54	140	Contact Air (Lufthansa)
ATR 72-500/600	68	94	331	Aurigny, Aer Arann, Contact Air (Lufthansa)
Canadair C100/300	110/130	30	30	SWISS (Lufthansa)
Airbus A318	107	24	36	Air France, British Airways (Long Haul only)
	Total	**507**	**1,684**	
Source: www.rati.com				

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Conclusion

4.33 Having assessed the range of aircraft types available and likely to be available for the foreseeable future – at least 10-15 years, taking into account the scale of the Guernsey market, we do not consider there is a pressing case for a longer length runway than that available currently. We would, nonetheless, caution against runway options which result, or potentially might result if the CAA did not accept the RESAs, in a shorter runway length. The time taken to secure planning approval may also be a consideration as to when the decision is taken to progress work on a runway extension.

4.34 Whilst we have considered what is known about future aircraft types and the requirements for access to London and/or other hubs, we cannot be certain that over the longer term there will not be pressure for a longer length of runway at some date in the future. On the basis of the option costings supplied to us by RPS Burks Green, it would appear prudent to consider spending a small amount more at this stage to facilitate the later provision of an extended runway. We go onto consider the economic case for this in the next section.

5 ECONOMIC ASSESSMENT OF DEVELOPMENT OPTIONS

Scenario Definition

5.1 In order to consider the implications of the development options on the economic position of the Island, and in order to derive a Cost Benefit Analysis, it is necessary to compile a set of scenarios which are based on assumptions about development works and passenger growth. For Guernsey, we have developed three scenarios, one with two sub-scenarios, these are:

- **No Development** - this is a hypothetical only scenario as we understand the States is committed to, as a minimum, refurbishing of the hard surfaces and providing adequate RESA's. It has been set out to provide a counterfactual for the analysis i.e. a base against which the impact of undertaking development works can be measured. Under this scenario, the only services which can be supported are those to Jersey and Alderney, with the loss of direct London services on the assumption that the runway condition would be inadequate to handle larger heavier turboprops and that passengers would primarily need to fly to Jersey to make their onward air journeys. We have assumed that there would be no cost to this option, which may be an understatement as there are likely to be some costs to maintain the airfield pavement even to sustain Jersey/Alderney services.

- **Refurbishment of Current Infrastructure** - this scenario is based on the costs of Option C (i) and assumes that the basic refurbishment of the pavement and RESA works are undertaken and has two sub-scenarios:

  (a) the runway is not long enough to prevent the **withdrawal of Flybe services to London Gatwick** over time, although Aurigny services to Gatwick continue as do Flybe services to all other points. It is assumed that Flybe withdraw this link in 2020[57] for the purpose of appraising the options. All of those passengers who would have previously flown with Flybe to/from

[57] We do not suggest that Flybe will necessarily withdraw services in 2020 or otherwise.

Gatwick are lost; and

(b) the runway is **long enough to sustain all of the services** for the whole period and no passengers are lost;

- **Refurbishment and Extension of the Runway** - this scenario is based on the cost of Option C (ii) assumes the full runway extension is provided immediately in order to safeguard the operations to the Island, but does not generate additional growth in the short to medium term, in line with our market assessment in Section 3.

5.2 We set out indicative passenger forecasts for 2015, 2020 and 2030 for each of these scenarios in **Table 5.1**.

Table 5.1: Passenger Forecasts by Scenario for Selected Years

	Year		
Scenario	**2015**	**2020**	**2030**
No Development	529,000	476,000	476,000
Refurbishment, Loss of Flybe Gatwick	928,000	753,000	807,000
Refurbishment, Retain Flybe Gatwick	928,000	960,000	1,030,000
Refurbishment and Extension	928,000	960,000	1,030,000
Source: York Aviation			

Operational GVA Impacts

5.3 Using the results of the employment survey and resulting calculations of GVA shown in Section 2, we are able to calculate the expected equivalent effects based on each scenario of passenger number for future years. Although the direct employment and income are scaled up (or down) based on changing passenger numbers, productivity growth is also provided for, at a rate of 3% per annum, inline with productivity gains noted at airports within the UK. The indirect and induced effects are once again calculated with a multiplier of 0.5. The resultant impacts for 2015 and 2030 are set out in **Table 5.2**.

Table 5.2: Operational Economic Impacts, 2015 and 2020 by Scenario				
	2015		2030	
Scenario	Total GVA Income	Total FTE Employment	Total GVA Income	Total FTE Employment
No Development	£18,082,596	491	£16,271,682	307
Refurbishment, Loss of Flybe	£31,721,454	861	£27,590,707	521
Refurbishment, Retain Flybe	£31,721,454	861	£35,201,956	664
Refurbishment and Extension	£31,721,454	861	£35,201,956	664
Source: York Aviation				

Value Connectivity

5.4 As with the operational impacts, it is also possible to provide estimates for changes to the Value Connectivity under each scenario. It is assumed that under Refurbishment (Loss of Flybe) scenario, 35 weekly flights are retained to London, and under the No Development scenario, all direct links to major cities are lost. We set out the results of this analysis in **Table 5.3**. As, we have projected forwards to 2030 based on the assumption of no substantive growth in the population of Guernsey or of the scale of the tourism market, the range and frequency of service to major cities remains as in 2009. The key difference highlighted is the loss of connectivity if the Gatwick services are partially lost.

Table 5.3: Estimated Value Connectivity of Guernsey by Scenario, 2030	
Airport	Value of Connectivity
No Development	0
Refurbishment, Loss of Flybe	482
Refurbishment, Retain Flybe	822
Refurbishment and Extension	822
Source: York Aviation	

Cost Benefit Analysis

5.5 So far we have concentrated on the Airport's impact in terms of GVA and employment. However, transport appraisal commonly focuses on the impact on broader economic welfare through the impact of infrastructure developments on transport economic efficiency using Cost Benefit analysis. This type of approach is central to a wide range of appraisal frameworks recommended for use by UK government agencies including the New Approach to Appraisal (NATA) and the Scottish Transport Appraisal Guidance (STAG). Although this is not a formal requirement on Guernsey, we consider that a more structured cost benefit analysis may assist the States in determining the 'best' option for the Island.

5.6 The New Approach to Appraisal is set out as the Department for Transport's best practice method for undertaking the appraisal of major transport schemes. While it is not specifically designed to be applicable to airport development projects, it is the basis of the approached used by DfT in appraisal of both the Future of Air Transport White Paper options and the options for the development of Heathrow. As the Eddington Transport Study makes clear the outputs of this approach are the *"most certain measure of welfare benefit"*[58]. However, the process has limitations in its abilities to examine issues around international competitiveness, trade and inward investment particularly, which are central to any assessment of an airport's importance.

[58] The Eddington Transport Study: The Case for Action, December 2006, Executive Summary, Page 34.

5.7 In terms of the issues considered in this report, this approach seeks to explore the benefits or costs to users from each of the development scenarios for Guernsey as defined earlier in this section. Typically in appraising large scale developments, the analysis would provide a quantitative assessment of the benefits of development, particularly those relating to improved productivity measured through user benefits, arising from growth of the market as a consequence of the development. However, because we do not envisage large scale growth resulting from the developments at GCI, our appraisal here is fundamentally about assessing the benefits attained from not losing air services. It should be noted that although this technique provides a monetary assessment of benefits, these benefits are not directly comparable with GVA and cannot be translated in to employment. It does, however, enable effective consideration of the balance between development costs and economic welfare benefits.

5.8 This discussion is organised under the following main headings:

- Growth Scenarios and Appraisal Period;
- Measures of Costs and Benefits;
- Net Present Value and Benefit-Cost Ratio;

Growth Scenarios and Appraisal Period

5.9 The cost-benefit analysis is based on the four scenarios described at the start of this section. The passenger numbers are as set out in Table 5.1.

5.10 In terms of the time period for this assessment, we have quantified costs and benefits relating to the developments through to 2038, 30 years from the current baseline. This assumes there are no further changes to market conditions in the intervening period and seeks the isolate the specific effects of the development options considered.

Measures of Costs and Benefits

5.11 We have quantified a number of economic costs and benefits associated with the development of Guernsey Airport, namely:

- Journey Time Savings;

- ✈ Air Fare Savings;
- ✈ Construction Costs.

5.12 We have not attempted to quantify environmental costs, although these would normally be a feature of an economic appraisal. Consideration of environmental issues is outside the scope of our terms of reference.

5.13 We examine each of these measures in more detail below and describe briefly the basis for their calculation. Summary calculation sheets are provided in **Appendix C**.

Journey Time Savings

5.14 Journey time savings are calculated by assuming that if direct services are lost as a consequence of a shorter runway only being available, passengers would have to travel via Jersey with an increased journey time of 60 minutes in each direction, allowing for the flight time between the Islands, plus baggage collection, check-in and passing through security at Jersey. We have estimated the cost of this by using values of time used by the UK Department for Transport for air passengers as used in the analysis underpinning the Future of Air Transport White Paper, restated to 2009 prices. The values of time are £1.11 per minute for business travellers and £0.19 per minute for leisure travellers.

Air Fare Savings

5.15 We have assumed that where passengers have to travel via Jersey rather than directly, they incur a £45 additional air fare penalty in each direction for business travellers and £33.50 in each direction for leisure travellers, which is roughly the equivalent of a typical fare between the islands with Aurigny and Blue Islands, depending on whether you book at last minute or with some advance notice (for leisure). It is assumed that the fares from Jersey onwards are the same as they would be for direct services from Guernsey.

Construction Costs

5.16 The construction costs associated with the refurbishment and (where necessary) further development of the runway have been calculated from the figures provided in Table 4.1. It is assumed that:

- the basic refurbishment and RESA works associated with the retention of the current runway length takes two years to complete, with equal expenditure in both years; and
- following completion of the above, a further year is taken to extend the runway in the final scenario.

5.17 These costs are all in nominal prices at 2009 values.

Net Present Values

5.18 In presenting the results of this analysis, we have derived the Net Present Values for both of the refurbishment scenarios and the runway extension scenario. In each case this compares a situation in which the upgrades are undertaken to the runway against a situation where nothing is done. The results are set out in **Table 5.4**. This includes two options for extending the runway. One of these is to do the works immediately following the initial runway refurbishment, and the second is to extend the runway at a later date, chosen now as 2019 for illustrative purposes in order to prevent the withdrawal of the Flybe services to Gatwick hypothetically in 2020.

Table 5.4: Net Present Values (NPV) of CBA by Scenario Compared to Do Nothing

Scenario	NPV
Refurbishment, Retain Flybe	£645,303,644
Refurbishment, Loss of Flybe	£565,872,545
Refurbishment and Extension (in 2011)	£605,162,684
Refurbishment and Extension (in 2019)	£614,820,135
Source: York Aviation	

5.19 Given the constraints on market growth, our analysis demonstrates the incremental costs of the extending the runway now simply translate to a net cost unless it is believed that the loss of services is imminent. However, the loss of benefit of over £80 million (£645 million – £565 million), if there was to be a partial loss of the Gatwick service, indicates that should this be a real risk there would be a strong economic case for constructing the extension to the runway to reinstate net benefits to the value of £40 million (£605 million - £565 million if the extension was constructed at the same time as the refurbishment works)[59]. To the extent that incurring the costs of extending the runway could be delayed, the net present value of the benefits would increase to of the order of £49 million if construction was delayed until 2019.

5.20 Furthermore, although our analysis measures the loss of consumer welfare, which translates for business travellers, to a measure of productivity, we would expect the loss of services to give rise to wider economic losses if there was a withdrawal of firms in the financial and insurance sectors, with consequent loss of employment.

5.21 We have also set out the results in a Decision Rule format in **Table 5.5** to establish which option gives the highest minimum return at the lowest risk of making a wrong decision or regretting the decision made.

Table 5.5: Decision Rule Analysis of Options (minimax)

Scheme	Benefit to Guernsey	
	Minimum	Maximum
Do Nothing	£0	£0
Refurbishment of Runway only	£565,872,545	£645,303,644
Refurbishment and Extension (at 2011)	£605,162,684	£605,162,684
Refurbishment and Extension (at 2019)	£614,820,135	£614,820,135
Source: York Aviation		

5.22 As can be seen from Table 6.6, the best option is not to extend the runway at present, but to retain the option to do so at a later date (with Option C (i)). This option generates minimum net present benefits £605 million and £645 million depending on the actual point of extension.

[59] Subject to a full evaluation of environmental costs.

6 FUNDING OPTIONS

6.1 Several funding options are under consideration for the proposed redevelopment works, ranging from the Government 'gifting' the full value of the development, through to the Airport paying for the development by way of a loan secured against the Airport as an asset and then repaid over the life of the project. There could also be shared funding, whereby both the States of Guernsey and the Airport will provide funding to the project. (The benefits to the States of Guernsey from the project as a whole are the subject of the main body of the Report).

6.2 If the Airport is to contribute to the scheme financially then it must find a way of funding a loan and the associated interest charges through additional aeronautical and commercial revenues. Its ability to do so is made particularly difficult as, in our assessment, the redevelopment works, even with a longer runway, are unlikely to bring any material increase in the number of passengers using the Airport in the short to medium term due to broader economic and policy considerations affecting the islands. Without additional passengers, the commercial income at the Airport (catering, retail, car parking etc) is unlikely to grow significantly in real terms, leaving the burden of cost to be funded from increased aeronautical revenues (landing fees and passenger charges).

6.3 At present, in addition to covering the operating costs of the facility, the Airport aims to achieve a 5% return on the turnover by way of dividend to the States of Guernsey and this is reflected in the level of charges which are calculated to attain this level of profit. In part, this 5% dividend would contribute to repaying any funding granted to the Airport by the States, including past construction costs.

6.4 Our brief does not extend to considering the options for funding the development in detail but does require us to advise on the sensitivity of demand and the pattern of air services to potential increases in airport charges which might be required dependent upon the extent to which the Airport was required to fund the development, under any option, from its own revenues.

Current Airport Charges

6.5 In 2008, the aeronautical income of the Airport equated to approximately £7.60 per passenger, or £15.60 per departing passenger if charges were levied solely on departures as is the normal practice at UK airports. To understand this in broad terms, **Table 6.1** places this in the context of average airport charge revenues per departing passenger at UK airports in the financial year 2007/08.

6.6 It is evident from Table 6.1 that revenue from airport charges at Guernsey is at the more expensive end of the range. These revenue estimates to a large extent reflect the actual charges paid by airlines after discounts are taken into account, whereas comparisons of published airport charges can be misleading where airlines are availing of significant discounts.

6.7 Typically the airports shown in Table 6.1 with an average fee per departing passenger of less than £10 are those which are dominated by low fares airlines, whilst those with average charges above £10 are dominated by traditional carriers, regional airlines and Flybe. This clearly highlights that Flybe, although claiming to be a low fares airline, is willing to accept higher airport charges than airlines such as Ryanair, easyJet, Jet2 and bmibaby.

6.8 Noticeably, in terms of average airport charges revenues, Guernsey sits between Exeter and Norwich which are both served by Flybe. Taken at face value, this would appear to provide some comfort that charges at Guernsey are not out of line with those paid by Flybe over their wider operations. However, it should be noted that charges at Guernsey for inter-island services are substantially discounted for 22% of the traffic so distorting the comparison, with charges for services to the mainland being materially higher. Similarly, the average revenues for Norwich are inflated as a consequence of a large number of operations by small aircraft and helicopter operations to the North Sea oil and gas fields, which pay higher charges on a per passenger basis than normal commercial scheduled services.

Table 6.1: Comparison of Average Charge Per Departing Passenger in 2007/08 for UK Airports and 2008 for Guernsey Airport

Airport	Charge Per Departing Passenger
Blackpool	£4.25
Liverpool	£4.62
Leeds Bradford	£6.30
Belfast International	£6.40
Luton	£8.06
Bournemouth	£8.57
Bristol	£8.88
Newcastle	£9.94
Gatwick	£9.95
Glasgow	£10.06
East Midlands*	£10.53
Stansted	£10.70
Edinburgh	£10.80
Cardiff	£12.26
Birmingham	£12.44
Southampton	£13.05
Aberdeen	£13.21
Manchester	£13.55
Exeter	£14.54
Guernsey	**£15.58**
Humberside	£17.11
Durham Tees Valley	£17.57
Heathrow	£18.41
Norwich	£19.15
London City	£30.80

Notes:
* The East Midlands aeronautical income includes a substantial amount from freight traffic distorting comparisons of charges revenue per passenger

Source: Centre for the study of Regulated Industries and Guernsey Airport

6.9 In our discussions with Flybe, the management highlighted that Guernsey is jointly the most expensive airport of their network within the United Kingdom and Protectorate Jurisdictions. The airline is sensitive to price increases, for example it withdrew a large proportion of its Norwich operations when that airport introduced a £5 airport development fee, even though this was charged directly to passengers, as it adversely affected airline yields and bookings.

6.10 Other airports which are more expensive than Guernsey, such as Heathrow and London City operate in extremely high yielding markets because of the nature of their traffic. Regional airports with high airport charges are characterised by low growth and service withdrawals, even before the current economic difficulties. **Table 6.2** shows an illustration of calculated passenger charges per departing passenger at a number of airports for a Dash-8-Q400 based upon the published fees and charges. We would highlight from this that both Exeter and Inverness are known to do deals with airlines and so it is unlikely that these charges are actually applicable as illustrated by the average charges shown in Table 6.1. The more interesting comparisons are those of Jersey and the Isle of Man, which perhaps show what Island communities can bear, with both of these being lower than the average charge per departing passenger at Guernsey at present.

Table 6.2: Comparison of Calculated Fees for Standard Aircraft Based on Published Charges

Airport	Fee/Departing Passenger
Inverness	£23.40
Isle of Man	£8.58
Norwich	£34.30
Jersey	£13.90
Exeter	£27.00
Gatwick (Peak)	£18.34
Gatwick (Off-Peak)	£11.26
Notes: Based on published charges assuming the operation of a DHC-8-Q400 (78 seats) with a 70% load factor (55 passengers). Max weight, 29.5 tonnes.	
Source: Individual Airport Terms and Conditions/Fees & Charges, York Aviation	

6.11 Whilst Guernsey does have a relatively captive market for outbound travellers, increases in charges to fund development could affect the choices of inbound passengers, particularly those whose travel is discretionary and partly influenced by price.

6.12 It is also a relevant consideration that passengers departing from UK airports are charged air passenger duty (APD). For comparable flights to those operated from Guernsey, APD is £10 per departing passenger[60]. Therefore arguably, when considering price sensitivity, the departing passenger charges at Guernsey must be compared to the airport charges *and* APD at UK airport, which would put Guernsey at a comparative level to many of the cheaper UK airports. We consider this point further in the report in relation to comparative air fares to/from Guernsey and competitor destinations.

Air Fares

6.13 In order to understand the ability to increase airport charges, some consideration must be given to the air fares available to and from the Island. During consultations with stakeholders, there has been some reference to fares being very high. We have undertaken a fares analysis which is shown in **Table 6.3** overleaf to show what fares are available on a selection of booking criteria which are:

- a day return business trip booked one week from travel, allowing 7.5 hours at the destination and bought on a fully flexible basis to allow ticket changes;
- a 5-night short break leisure stay, booked 6 weeks in advance on the basis of lowest fare available (i.e. not flexible); and
- a 7-night leisure trip, to reflect more traditional tourism markets to the Island and to reflect Guernsey residents making a primary holiday. This is booked 3 months in advance on the basis of lowest fares possible (i.e. not flexible).

[60] For most domestic services the passenger must pay on departure from both domestic airports on a return flight. Some exceptions are made related to the Highlands and Islands of Scotland.

6.14 One of the concerns expressed about the fare levels is that air travel is more expensive for Islanders, and so we have undertaken searches for travellers with origins at both ends of a route. The results set out in Table 6.3 show that this is not necessarily the case, with Guernsey based business travellers paying the same or less across all routes; and Guernsey based leisure travellers paying less or the same for Bristol, Manchester and Gatwick, but slightly more under some criteria for Southampton. Fares to Jersey are consistent for all travellers.

Table 6.3: Comparison of Fares To/From Guernsey

Destination	Airline	Guernsey Resident 1-Week Away Day Return/Flexible 21/04/2009	Guernsey Resident 6-Weeks 5-Nights (Start Thurs) 14/05/09 - 19/05/09	Guernsey Resident 3-Month Away 7 Nights 25/07/09 - 01/08/09	Non-Guernsey Resident 1-Week Away Day Return/Flexible 21/04/2009	Non-Guernsey Resident 6-Weeks 5-Nights (Start Thurs) 14/05/09 - 19/05/09	Non-Guernsey Resident 3-Month Away 7 Nights 25/07/09 - 01/08/09
London Gatwick	FlyBe	£382	£90	£90	£382	£104	£90
	Aurigny	£398	£68	£68	£398	£76	£90
	Route Average	**£390**	**£79**	**£79**	**£390**	**£90**	**£90**
Manchester	FlyBe	-	£174	£130	-	£174	£136
	Aurigny	£472	£92	£91	£472	£92	£91
	Route Average	**£472**	**£133**	**£111**	**£472**	**£133**	**£114**
Southampton	FlyBe	£380	£90	£90	£380	£70	£90
	Aurigny	£225	£196	£225	£208	£196	£196
	Blue Islands	£138	£118	£118	£158	£118	£118
	Route Average	**£248**	**£135**	**£144**	**£249**	**£128**	**£135**
Bristol	**Aurigny**	**£364***	**£74**	**£84**	**£364***	**£104**	**£84**
Birmingham	**FlyBe**	**£226****	**£182**	**£138**	**£436**	**£166**	**£115**
Jersey	FlyBe	No Seats	£82	-	No Seats	£82	-
	Aurigny	£94	£66	£66	£94	£66	£66
	Blue Islands	£87	£69	£69	£87	£69	£69
	Route Average	**£91**	**£68**	**£68**	**£91**	**£68**	**£68**

Notes:
* Day return not possible and in order to achieve a sensible working day return must be made 2 says later.
* Day return not possible and in order to achieve a sensible working day return must be made the following day

Source: York Aviation and Airline Websites

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6.15 In our experience, these fares are comparable to regional airports within the United Kingdom for the type of airlines serving Guernsey. Indeed, some stakeholders referred to air fares when British Airways and Jersey European (now Flybe) dominated the Airport. These stakeholders believe that the fares offered now to and from Guernsey are cheaper than were previously seen and that it is only because of the perception generated by the ultra low fares available from easyJet and Ryanair that some travellers consider the fares to and from Guernsey to be expensive.

6.16 As we highlighted earlier in this report, the majority of stakeholders supporting a runway extension do so on the basis of securing the current position rather than attracting in lower fares airlines. However, a limited number of stakeholders highlighted that they would support lower fares brought forward by a low fares airline. Whilst the analysis of the market and development options earlier in this report would suggest there is little need for a runway extension at this time, we have undertaken a further air fares analysis to illustrate the differences in fares paid by those travelling to/from Guernsey by comparison to Jersey, where lower fare airlines operate. We have selected 2 routes, one of which has now ultra low fares competitor (London Gatwick, served by British Airways and Flybe) and one which is served by Flybe and a ultra low fares carrier (bmibaby to Manchester). The latter route also comes under pressure from the easyJet service from nearby Liverpool which has an overlapping catchment area. We set out the results in **Table 6.4**.

6.17 It is interesting to note that on services to Gatwick, Guernsey provides lower air fares than services from Jersey where there is more capacity to be filled. It is also interesting to note that easyJet was unable to succeed on the London (Luton) services where it should have been able to undercut the two remaining carriers. In the case of Manchester there is a mix of one or other Island generating lower fares, but the important aspect to consider is that in cases where the fare is higher for Guernsey services, the difference is not as significant as the fare differences where the Jersey services is cheaper.

Table 6.4: Comparison of Fares From Guernsey/Jersey and Manchester and London Gatwick

		Guernsey/Jersey Resident			Non-Guernsey/Jersey Resident		
		London Gatwick					
		Guernsey or Jersey - London Gatwick			London Gatwick - Guernsey or Jersey		
	Outward Date	1-Week Away Day Return/Flexible 21/04/2009	6-Weeks 5-Nights (Start Thurs) 14/05/09 - 19/05/09	3-Month Away 7 Nights 25/07/09 - 01/08/09	1-Week Away Day Return/Flexible 21/04/2009	6-Weeks 5-Nights (Start Thurs) 14/05/09 - 19/05/09	3-Month Away 7 Nights 25/07/09 - 01/08/09
Guernsey	FlyBe	£382	£90	£90	£382	£104	£90
	Aurigny	£398	£68	£68	£398	£76	£90
Average		£390	£79	£79	£390	£90	£90
Jersey	FlyBe	£374	£85	£64	£382	£127	£85
	British Airways	£374	£138	£108	£384	£149	£98
Average		£374	£112	£86	£383	£138	£92
Guernsey Average Difference		**£16**	**-£33**	**-£7**	**£7**	**-£48**	**-£2**
		Manchester					
		Guernsey or Jersey - Manchester			Manchester - Guernsey or Jersey		
	Outward Date	1-Week Away Day Return/Flexible 21/04/2009	6-Weeks 5-Nights (Start Thurs) 14/05/09 - 19/05/09	3-Month Away 7 Nights 25/07/09 - 01/08/09	1-Week Away Day Return/Flexible 21/04/2009	6-Weeks 5-Nights (Start Thurs) 14/05/09 - 19/05/09	3-Month Away 7 Nights 25/07/09 - 01/08/09
Guernsey	FlyBe	-	£174	£130	-	£174	£136
	Aurigny	£472	£92	£91	£472	£92	£91
Average		£472	£133	£111	£472	£133	£114
Jersey	FlyBe	£606*	£132	£149	£454	£136	£130
	bmibaby	-	£83	£119	-	£63	£129
Average		£606	£108	£134	£454	£100	£130
Guernsey Average Difference		**-£134**	**£26**	**-£24**	**£18**	**£34**	**-£16**

Notes
*Requires overnight stay to achieve business day at destination

Source: Airline Websites

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6.18 Our analysis highlights that the case for extending the runway to bring lower fares to the Island is not persuasive. However, in terms of funding the development of the runway, the relatively low fares offered by airlines serving Guernsey, at least for leisure based trips, is a factor in considering the extent to which increased airport charges could be passed onto passengers without impacting on demand.

Passenger Charges Sensitivity

6.19 The conventional approach to the impact of increased airport charges is to examine the price elasticity of demand, albeit airlines may initially have to absorb the increases in price. In the medium to long term, airlines will withdraw services to retain the balance of yield and price at a profitable equilibrium.

6.20 A study prepared by InterVISTAS for the International Air Transport Association (IATA) in 2007[61] provides evidence to highlight the demand elasticities of air travel. The report found that elasticities for short haul travel overall are generally higher than for long haul travel, partly because of the availability of alternative modes of travel. Arguably, this means that lack of suitable alternatives to air could mean that the Guernsey air travel market would exhibit lower demand elasticities to increases in price. There are, however, countervailing factors.

6.21 The inbound leisure market is subject to competition, with competition in Europe being not just between modes of travel but between airports and routes. Passengers often select their destination based on the price of travel rather selecting the destination first. There is, overall, less brand loyalty to a particular destination than previously.

6.22 Similarly, in the case of the business community, the competition for location decisions is driven by many factors. In the short term, business travellers may show a low elasticity to increases in cost but over the longer term, higher costs, particularly in comparison with competing jurisdictions such as Jersey and the Isle of Man both of which we understand have lower airport charges, may lead to a loss of businesses overall.

[61] *Estimating Air Travel Elasticities: Final Report*, IATA, 28th December 2007

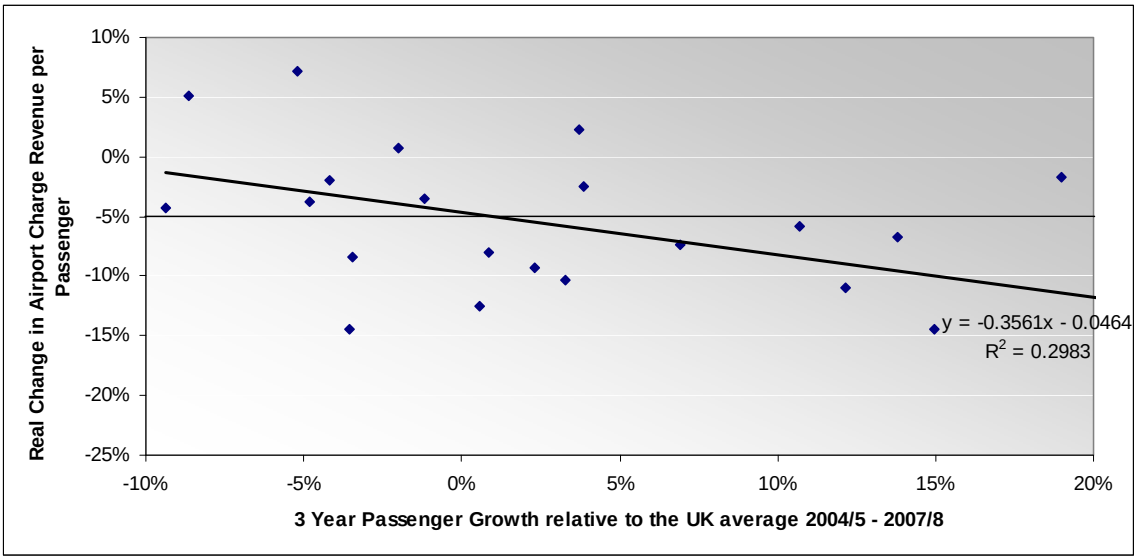
6.23 The InterVISTAS study showed that on intra European flights, the overall demand elasticity of travellers to changes in air fare or cost was -1.96, i.e. for every 1% increase in cost demand may be expected to fall by almost 2%. This high elasticity is in part a reflection of the lower air fares available within Europe as a whole, including Guernsey, which have stimulated new passengers to travel or additional trips across the network as a whole. This market is potentially more sensitive to any factor leading to an increase in the air fare.

6.24 Whilst we do not have precise average air fare data for Guernsey, we can make estimates based on the sample fares set out in Table 6.3. Taking a 1-way fare of £100 as an example, an increase in airport charges per passenger of £1 would result in an effective increase in fare of almost 1%, suggesting a reduction in demand of almost 2%. However, this may not fully take into account the effect on airline decision making of any increase in costs, as we discuss further below.

6.25 Using data published by the University of Bath, Centre for the Study of Regulated Industries (CRI), it is possible to examine the trend between passenger numbers and changes in the level of airport charges at the overall airport level. Over a 3 year period this has consistently shown that there is a general trend that where charges are decreasing in real terms, passenger numbers at an airport are likely to grow faster than the average and where charges are increasing in real terms, passenger growth is generally below the average. The absolute level of airport charges is also a factor. The relationship over the 3 years 2004/5 to 2007/8 is shown in **Figure 6.1**.

6.26 It is accepted, however, that given the finite population and limited hotel bed stock on Guernsey, the question of whether lower airport charges would stimulate growth by attracting airlines to offer additional services is something of a moot point. However, the potential for an increase to give rise to a fall in passenger numbers, for the reasons set out above, would clearly be of greater concern.

Figure 6.1: Relationship Between Real Changes in Passenger Charges and Passenger Growth at UK Airports over 3 Years



Source: York Aviation

6.27 In the current market, airlines and passengers remain highly price sensitive, particularly as the presence of low fares in the market as a whole has left airlines vulnerable to any erosion of their yields. These effects will be felt much more strongly in discretionary inbound markets than for the core outbound traffic. Increased prices could further erode the attractiveness of Guernsey for inbound tourists as the availability of low fares in the market as a whole means that many travellers choose their destination based on the cost of travel. Increased airport charges would place Guernsey at a further competitive disadvantage, whether passed on to passengers or absorbed by the airlines, resulting in a loss of service frequencies.

6.28 It has been put to us that the local Guernsey population represents a captive market and that this market would be prepared to accept higher prices. This would, however, have an economic and a social cost to Guernsey and might impact on its attractiveness as a business location. It would be wrong to assume that residents would fly at any price. We have already considered that the economy of Guernsey, and its ability to financially support the residents, is dependent upon retaining the financial sector and associated employees on higher salaries. The relationship between using Guernsey residents as 'cash cows', willing to pay any price, and retention of these sectors would seem to be a delicate one. The perceived cost of air fares has already been highlighted as a concern by some residents, even if the fares are broadly comparable with those offered to Jersey. When deciding whether to take up employment on the Island, potential employees are likely to consider their overall costs and social wellbeing, and high airfares to return back to the mainland could adversely impact on this. In turn, the inability to attract the required number of employees may impact on company location decisions and could drive companies to other jurisdictions to which they can more easily attract high calibre employees.

6.29 In **Table 6.5**, we set out an indication based on the CRI analysis, of how changes in airport charges might be expected to impact on demand relative to expected levels of growth. For example, if charges rose by £1.95 per passenger to pay for development, as suggested by some of our consultees, this would be a 25% increase in charges which could result in a reduction of demand in excess of 7%, although the impact would be cushioned to an extent due to the captive nature of a high proportion of outbound demand from the Island. This relatively low increase in airport charges is, we understand, based on the assumption that loan finance is obtained at low rates of interest. Earlier assessments by Ernst & Young suggested that charges might be required to double if the costs were more directly passed through, which we will explore further later in this section. Clearly, such an increase in price would have a far more substantial impact to the extent that, in our view, existing levels of service would be seriously at risk.

6.30 In the current competitive market, airlines typically find it difficult to pass increased costs through to passengers so the impact of increased charges is seen more in airlines withdrawing services than in an immediate impact on air fares. Bluntly, some services cease to be economically viable for the airlines, as was seen in the withdrawal of services by airlines from Stansted when that airport doubled its airport charges in 2007 or Flybe's partial withdrawal from Norwich when the airport introduced a development charge direct to passengers. This is the risk which Guernsey runs if airport charges are increased to fund either the refurbishment of the runway or its extension in circumstances where the development cannot be paid for through increasing demand.

Table 6.5: Effects on Passenger Growth Through Price Increases

Increase in Passenger Charges	Reduction in Annual Growth
1.00%	-0.4%
2.00%	-0.7%
3.00%	-1.1%
4.00%	-1.4%
5.00%	-1.8%
6.00%	-2.1%
6.50%	-2.3%
7.00%	-2.5%
8.00%	-2.8%
9.00%	-3.2%
10.00%	-3.5%
11.00%	-3.9%
12.00%	-4.2%
13.00%	-4.6%
14.00%	-4.9%
15.00%	-5.2%
16.00%	-5.6%
17.00%	-5.9%
18.00%	-6.3%
19.00%	-6.6%
20.00%	-6.9%
Source: York Aviation LLP	

6.31 What this does mean though is that any routes which are marginal in terms of passenger numbers and profit for an airline could be jeopardised. In these cases, the airline will be unlikely to absorb the cost (if their yield, the profit per seat, is less than the additional charges) and will try to pass it all on, which may then be considered restrictive to a some passengers and lead to a further reduction in passenger numbers, which is likely to see a carrier react by withdrawing from the market. In the case of Guernsey, such increases could impact on frequencies of service more generally and, particularly, in respect of the all important London Gatwick service, this could increase the likelihood of Flybe switching scarce Gatwick slots to a more profitable opportunity, with adverse economic consequences which we have already described earlier in the report. Other services which might be particularly vulnerable are those where demand is relatively low, such as the Birmingham link, which is already operated in conjunction with Jersey.

Ability to Increase Guernsey Charges

6.32 As has been highlighted to us by consultees, airport charges on Guernsey in effect cover both the direct airport charge and a Government tax so comparing airport charges at GCI with those at UK airports could be misleading without also taking into account the level of Air Passenger Duty (APD) charged in the UK. Whilst this is true in terms of comparing the actual level of charge and indeed the total fare to be paid by the passenger, it does not alter the relationship by which an increase in costs would lead to some reduction in demand.

6.33 In the first instance, it is necessary to establish by how much the per passenger airport charge would need to increase in order to fund the development. In **Table 6.6**, we summarise the costs of development under the preferred options and how it might be passed through to passengers. Our calculation assumes a cost of capital is 5%[62] and that only the interest is paid over each loan period, with the loan paid in one lump sum in the final year. This also assumes passenger growth in line with that set out in Table 3.4.

[62] This is just an assumption to give a set figure for testing. This could potentially be higher or lower depending on the capital offered to the Island.

Table 6.6: Additional Passenger Charges Required to Cover Full Cost of Development			
	Asset Life		
	20 Years	25 Years	30 Years
Option C(i)			
Capital	£84,500,000	£84,500,000	£84,500,000
Cost of Capital	£84,500,000	£105,625,000	£126,750,000
Total to Repay	£169,000,000	£190,125,000	£211,250,000
Additional Charge per Departing Passenger	£17.76	£15.70	£14.28
Option C(ii)			
Capital	£127,500,000	£127,500,000	£127,500,000
Cost of Capital	£127,500,000	£159,375,000	£191,250,000
Total to Repay	£255,000,000	£286,875,000	£318,750,000
Additional Charge per Departing Passenger	£26.80	£23.69	£21.55
Source: York Aviation			

6.34 It is clear from Table 6.6, that should the airport be required to fund the development on a conventional loan basis, the costs to be passed through to passengers would be prohibitive, representing more than double the current level of airport charges in most cases. If we take an average return air fare of around £160, based on the analysis set out in Table 6.3, then the cost of travel could rise by between 9% and 11% to fund the runway refurbishment works or between 13.5% and 17% to fund a scheme to deliver an extended runway. Such increases could reduce demand by around 20% in the case of the refurbishment works and around 30% if the costs of an extended runway were also passed through to passengers. In our discussions, both Flybe and Aurigny indicated that a doubling of airport charges would be disastrous to their business and would cut out a substantial amount of the leisure traffic, resulting in a loss of routes.

6.35 We set out in **Table 6.7** an indication of the level of revenue which could be raised from different levels of price increase. This gives some indication of the ability of the Airport to raise revenue to contribute to the costs of development. For example, a price increase of around £2 would cover over 10% of the cost of refurbishment.

Table 6.7: Revenue Generated By Selected Increases in Charge per Departing Passenger			
Additional Charge Per Departing Passenger	**20 years**	**25 years**	**30 years**
£1.00	£9,515,161	£12,107,862	£14,792,586
£2.00	£19,030,323	£24,215,723	£29,585,171
£4.00	£38,060,646	£48,431,446	£59,170,342
£6.00	£57,090,968	£72,647,169	£88,755,513
£8.00	£76,121,291	£96,862,892	£118,340,684
£10.00	£95,151,614	£121,078,615	£147,925,856
£12.00	£114,181,937	£145,294,339	£177,511,027
£14.00	£133,212,259	£169,510,062	£207,096,198
Total Cost of Option C (i)	£169,000,000	£190,125,000	£211,250,000
Source: York Aviation			

Conclusion

6.36 In our view, such an increase in the cost of using the Airport would have a damaging effect on the Island's economy more generally because of the impact on the tourism industry and because of the effect of cost increases on the range and frequency of air services which the airlines would be able to offer, impacting on the attractiveness of the Island as a business location.

6.37 Although in theory, the benefits to users from improved airport infrastructure should be able to be captured by an increase in price, in this case, the benefits are largely wider societal and economic benefits for the Islands of Guernsey as a whole, such as retention of employment and employees. These wider benefits are not capable of being captured by the airlines by way of increased air fares, airport charges ultimately forming part of the air fare even if shown separately. Hence, there is a case for some level of funding to be 'gifted' by the States in recognition of these wider benefits.

6.38 Our assessment of the price sensitivity of the market is such that, even allowing for Guernsey to be at the lower end of the short haul price sensitivity range, would suggest that anything more than a nominal increase in airport charges runs the risk of passenger demand being reduced and airlines withdrawing capacity. Notwithstanding the fact that Guernsey's airport charges are already higher than average, it may be possible to manage the impact an increase of the order £1.95 per passenger, as has been suggested by some consultees, without doing substantial damage to the air travel market given the 'captive' nature of resident demand. Such an increase is not without some risk of damaging the market by up to 7% and some loss of services and will come at some economic cost to the Island by way of reduced productivity and increased costs of doing business. In our view, however, increases in charges above these levels would give rise to substantial damage to the economy of Guernsey as a whole.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 We have examined the economic importance of Guernsey Airport to the Island's economy and social wellbeing. Although the Airport supports 649 full-time equivalent (fte) direct jobs and supports an income injection of £31.2 million into the Guernsey, through direct, indirect and induced employment and operations, the main economic benefit from the Airport comes from the contribution it makes to the connectedness of the Bailiwick as a place to live, work and visit.

7.2 Guernsey is heavily dependent on air service connections and these have been of critical importance in sustaining the tourism industry and in attracting businesses in the financial and insurance sectors.

7.3 Our discussions with stakeholders revealed the critical importance of the link to London Gatwick, both in terms of direct access to the World's financial capital in London and as a connecting service allowing global access for business and leisure purposes. It was suggested that some firms would withdraw from the Island if the Gatwick link was lost. Other UK regional routes are valued, both for business purposes and for as opportunities to attract inbound tourism.

7.4 At present, Guernsey is well connected by air for its size and scores more highly than its competitor, in the financial services sector, the Isle of Man in our Value Connectivity Index.

7.5 The wider policy considerations of the States, which limit the population on the Island, along with the apparent lack of desire by the hospitality sector to develop growth in bed spaces in hotels, do act as a limit on the growth potential of the air services serving the Airport. Our analysis of the market indicates that there are few additional destinations which offer strong market prospects for direct services in the immediate future. This view was shared by local stakeholders, who did not suggest that there were particular cities missing from the current service portfolio. The overwhelming requirement was the maintenance of the link to London, along with the ability to connect to points globally. Our analysis of these connections shows an absence of particular concentrated flows.

7.6 The inbound tourism industry is keen to see seasonal links from Germany and the Netherlands continue and there are cultural links with France. Over and above this, there is little expectation of new services. Hence, our expectation that the Airport is likely to only marginal growth in passenger numbers over the coming years, consistent with the incremental growth seen in the recent past.

7.7 Hence, consideration of the development options for the Airport is not about creating a platform for growth. Rather, the concern is primarily to ensure that the existing key services are maintained. As was made clear in the brief for this study and in our discussions with stakeholders, there is a concern that either structural or technological changes within the aviation industry will result in airlines no longer having the aircraft available which could use a 1,463m runway at GCI or that pricing policies at other airports, particularly Gatwick, will price out operations by smaller aircraft.

7.8 In terms of the benefits of extending the runway, our analysis has identified a potential tension between the requirements of the business community for high frequency, appropriately timed services, and the requirement more generally for routes to a range of UK and European points and the drive to larger aircraft and lower fares. Our assessment is that the market will be better served for the time being by higher frequency services by smaller aircraft capable of using the existing runway length.

7.9 We have assessed the range of aircraft types available and likely to be available for the foreseeable future – at least 10-15 years. Taking into account the scale of the Guernsey market, we do not consider there is a pressing case for a longer length runway than that available currently. We have considered the risks associated with remaining with the existing runway lenght and consider such risks to be minimal in the short to medium term in the light of the number of small regional jet and turbo-prop aircraft in manufacture and being acquired by airlines capable of serving Guernsey.

7.10 However, whilst we have considered what is known about future aircraft types and the requirements for access to London and/or other hubs, we cannot be certain that over the longer term there will not be pressure for a longer length of runway at some date in the future. There may be changes in the airline market over the longer term which could lead to a requirement to introduce larger aircraft requiring a longer runway but we do not consider that there is a market imperative for the foreseeable future.

7.11 We would, however, caution against runway options which result, or potentially might result if the CAA did not accept the RESAs, in a shorter runway length, which in our view rules out some options put forward. Furthermore, on the basis of the option costings supplied to us by RPS Burks Green, it would appear prudent to consider spending a small amount more at this stage to facilitate the later provision of an extended runway. Securing the ease of development will cost £1 million extra in the short term by selecting Option C (i), but could save £5 million in the longer term and this appears to us the most sensible option

7.12 We have quantified the benefit to Guernsey from ensuring that the Airport remains able to handle the current portfolio of operations. In terms of economic welfare, the value to the Island of the current portfolio of services over a 30 year period with modest growth is some £645 million in net present value terms, net of the cost of refurbishing the runway on its current length. Loss of some Gatwick frequencies would erode this benefit by some £80 million.

7.13 However, in the face of limited scope for market growth, the provision of a longer runway is simply a cost without any incremental benefit. The need for a longer runway then comes down to an assessment of the risks attached to not providing it at the present time. We consider these to be minimal in the short to medium term but that the risk does exist in the longer term, at least in terms of the risk to the Gatwick route. The loss of benefits should even some of these services be lost would suggest that there would be a case for incurring the incremental cost of the runway extension scheme at a future date.

7.14 The scheme to refurbish the runway and the remaining pavement areas at the Airport, even without an extension to the runway, comes at a high cost estimated at £84.5 million (Option C (i)). If these costs were fully passed onto users of the Airport, in our view, such an increase in the cost of using the Airport would have a damaging effect on the Island's economy more generally because of the impact on the tourism industry and because of the effect of cost increases on the range and frequency of air services which the airlines would be able to offer, impacting on the attractiveness of the Island as a business location.

7.15 Although in theory, the benefits to users from improved airport infrastructure should be able to be captured by an increase in price, in this case, the benefits are largely wider societal and economic benefits for the Islands of Guernsey as a whole, such as retention of employment and employees. These wider benefits are not capable of being captured by the airlines by way of increased air fares, airport charges ultimately forming part of the air fare even if shown separately. Hence, there is a case for some level of funding to be 'gifted' by the States in recognition of these wider benefits.

7.16 Our assessment of the price sensitivity of the market is such that, even allowing for Guernsey to be at the lower end of the short haul price sensitivity range, would suggest that anything more than a nominal increase in airport charges runs the risk of passenger demand being reduced and airlines withdrawing capacity. It may be possible to manage the impact an increase of the order £1.95, as has been suggested by some consultees, but increases above these levels would, in our view, give rise to substantial damage to the economy of Guernsey as a whole. We consider that the level of benefits generated for the Guernsey economy would justify some level of support to be gifted by the States as our NPV appraisal demonstrates substantial net benefits even after taking account of the cost of development.

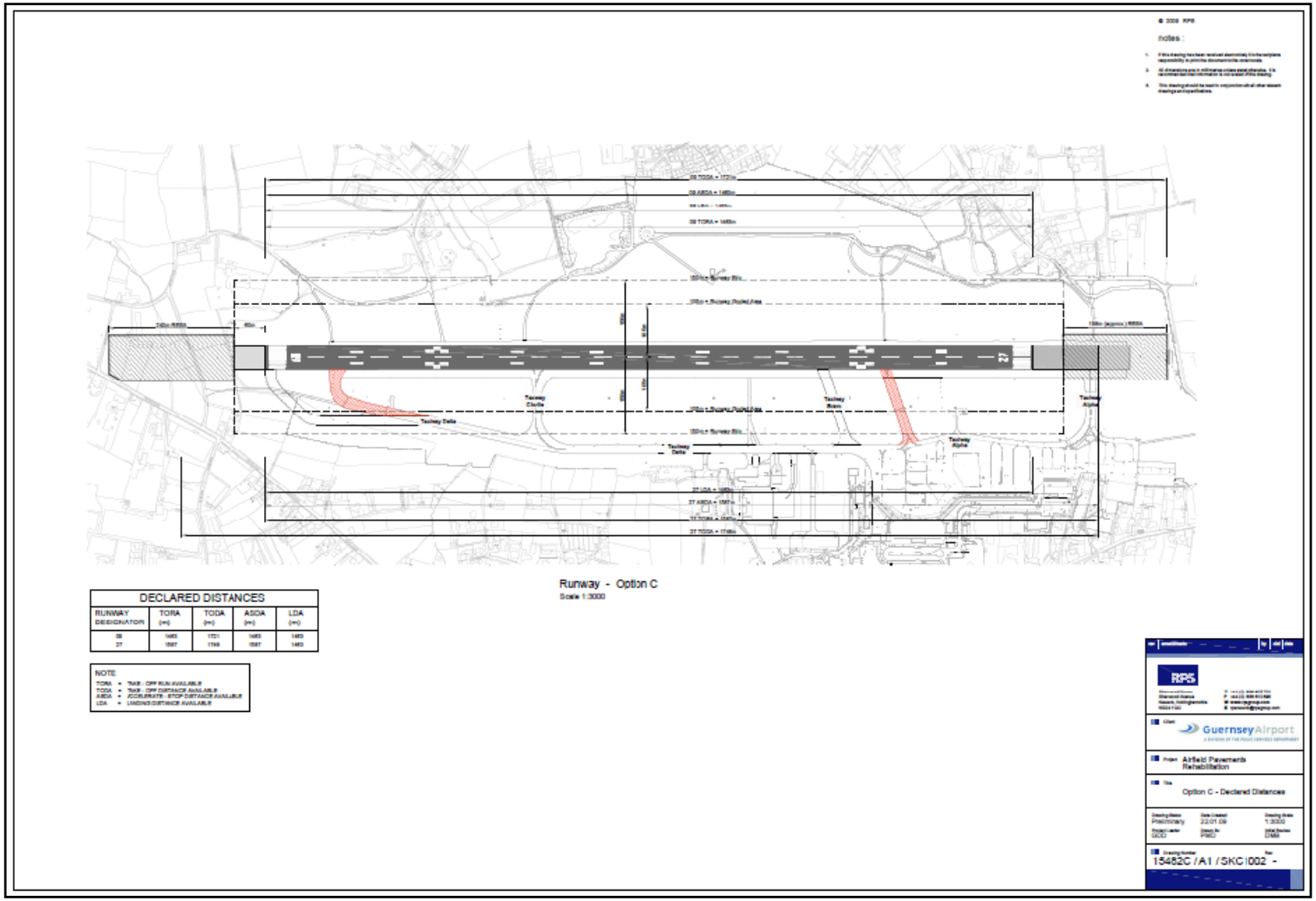
APPENDIX A:

LIST OF STAKEHOLDERS CONSULTED

List of Stakeholder Consultees		
Consultee	**Organisation**	**Completed**
Derek Coates	Healthspan Limited/Blue Islands	✓
Paul Luxon	Chamber of Commerce	✓
Steve Le Page	G.I.B.A. (+ all committee members)	✓
Peter Budwin	Confederation of Guernsey Industry	✓
Peter Niven	GuernseyFinance LBG	✓
Shelagh Mason	Institute of Directors	✓
Peter Neville	Guernsey Financial Services Commission	✓
Chris Elliott	Marketing & Tourism, Commerce and Employment	✓
Mike Rutter	Flybe	✓
Christopher Sharp	Guernsey Hospitality & Tourism Group	✓
Jim Gilligan	The Association of Guernsey Banks	✓
Dudley Jehan	Guernsey Airport User Committee	✓
Jan Kuttelwascher	States of Guernsey	✓
Hue Bougard	Guernsey Transport Users Committee	✓
Tristan Estevas	Specsavers Optical Group Ltd	✓
Malcolm Hart	Aurigny Air Services Limited	✓
Mike Perry	Commander High	✓
Dominic Heysome	easyJet	✓

APPENDIX B:

OPTION PLANS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DECLARED DISTANCES
RUNWAY DESIGNATOR
TORA (m)
TODA (m)
ASDA (m)
LDA (m)
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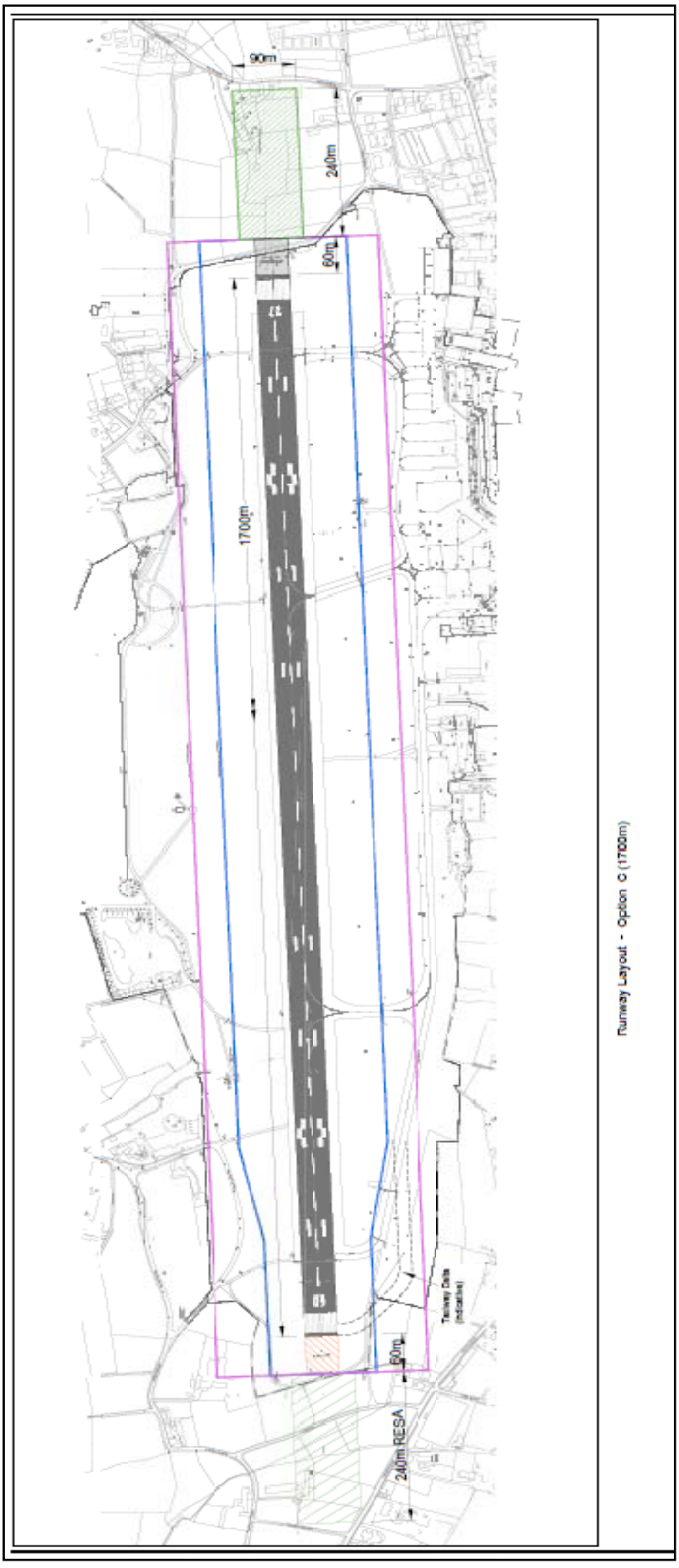
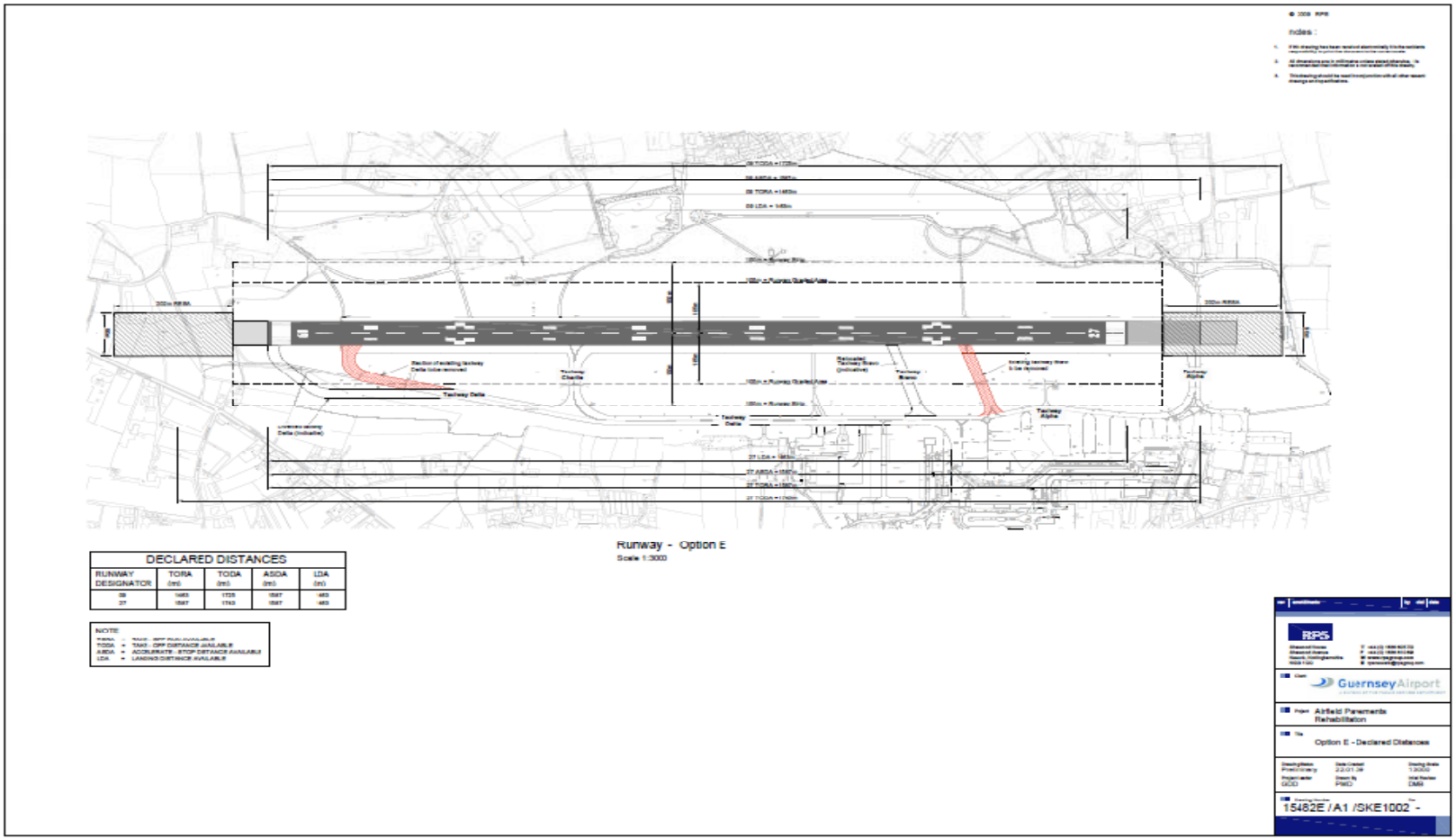
27 1587 1748 1587 1483
NOTE:
TORA = TAKE - OFF RUN AVAILABLE
TODA = TAKE - OFF DISTANCE AVAILABLE
ASDA = ACCELERATE - STOP DISTANCE AVAILABLE
LDA = LANDING DISTANCE AVAILABLE
RPS
Guernsey Airport
Airfield Pavements Rehabilitation
Option C - Declared Distances
15482C / A1 / SKC1002 -

2077


90m
240m
60m
1700m
60m
240m RESA
Runway Layout - Option C (1700m)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DECLARED DISTANCES
RUNWAY DESIGNATOR
TORA
TODA
ASDA
LDA
09
27
Guernsey Airport
Airfield Pavements Rehabilitation
Option E - Declared Distances
15482E /A1 /SKE1002 -

APPENDIX C:

NPV CALCULATION SHEETS

Background Numbers

Do Nothing (1) vs option C (i) Retain LGW																																
				2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Passengers																																
	Outbound Business		13.6%	121,519	121,519	109,367	98,430	88,587	79,729	71,756	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580	64,580
	Outbound Leisure		44.7%	400,160	400,160	360,144	324,130	291,717	262,545	236,291	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662	212,662
	Inbound Business		12.2%	109,607	109,607	98,646	88,781	79,903	71,913	64,722	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249	58,249
	Inbound Leisure		29.5%	264,434	264,434	237,991	214,192	192,773	173,495	156,146	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531	140,531
	Total			895,720	895,720	806,148	725,533	652,980	587,682	528,914	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022	476,022
Diverted Passengers																																
	Outbound Business			94,799	94,799	82,460	71,335	61,302	52,253	44,087	36,718	36,523	36,327	36,129	35,930	35,729	35,527	35,324	35,119	34,913	34,705	34,496	34,285	34,073	33,860	33,645	33,428	33,210	32,991	32,769	32,547	32,323	32,097
	Outbound Leisure			312,172	312,172	271,540	234,905	201,868	172,067	145,179	120,912	120,270	119,623	118,972	118,316	117,656	116,991	116,321	115,647	114,968	114,284	113,595	112,902	112,203	111,500	110,792	110,079	109,361	108,638	107,910	107,176	106,438	105,694
	Inbound Business			85,506	85,506	74,377	64,342	55,293	47,130	39,766	33,119	32,943	32,766	32,587	32,408	32,227	32,045	31,861	31,676	31,490	31,303	31,114	30,925	30,733	30,541	30,347	30,151	29,955	29,757	29,557	29,356	29,154	28,950
	Inbound Leisure			206,290	206,290	179,439	155,230	133,398	113,705	95,937	79,901	79,477	79,050	78,619	78,186	77,749	77,310	76,867	76,422	75,973	75,521	75,066	74,608	74,146	73,682	73,214	72,742	72,268	71,790	71,309	70,824	70,336	69,845
	Total			698,766	698,766	607,816	525,813	451,861	385,155	324,970	270,651	269,213	267,765	266,308	264,840	263,361	261,873	260,374	258,864	257,344	255,813	254,272	252,719	251,156	249,582	247,997	246,401	244,794	243,175	241,545	239,904	238,251	236,587
Average Fare Difference																																
	Outbound Business		£45.00	£4,265,952	£4,265,952	£3,710,700	£3,210,073	£2,758,602	£2,351,365	£1,983,931	£1,652,315	£1,643,539	£1,634,701	£1,625,801	£1,616,839	£1,607,814	£1,598,726	£1,589,574	£1,580,359	£1,571,078	£1,561,733	£1,552,323	£1,542,846	£1,533,303	£1,523,694	£1,514,017	£1,504,272	£1,494,459	£1,484,578	£1,474,627	£1,464,607	£1,454,516	£1,444,355
	Outbound Leisure		£33.50	£10,457,762	£10,457,762	£9,096,591	£7,869,330	£6,762,571	£5,764,250	£4,863,506	£4,050,566	£4,029,051	£4,007,385	£3,985,568	£3,963,598	£3,941,474	£3,919,195	£3,896,760	£3,874,168	£3,851,418	£3,828,509	£3,805,439	£3,782,208	£3,758,815	£3,735,257	£3,711,535	£3,687,646	£3,663,591	£3,639,367	£3,614,973	£3,590,409	£3,565,672	£3,540,763
	Inbound Business		£45.00	£3,847,766	£3,847,766	£3,346,945	£2,895,394	£2,488,180	£2,120,863	£1,789,449	£1,490,341	£1,482,425	£1,474,453	£1,466,426	£1,458,342	£1,450,202	£1,442,005	£1,433,750	£1,425,438	£1,417,068	£1,408,639	£1,400,151	£1,391,603	£1,382,996	£1,374,328	£1,365,600	£1,356,810	£1,347,960	£1,339,047	£1,330,071	£1,321,033	£1,311,932	£1,302,767
	Inbound Leisure		£33.50	£6,910,702	£6,910,702	£6,011,212	£5,200,213	£4,468,845	£3,809,133	£3,213,904	£2,676,697	£2,662,479	£2,648,162	£2,633,744	£2,619,226	£2,604,606	£2,589,884	£2,575,058	£2,560,129	£2,545,095	£2,529,957	£2,514,712	£2,499,360	£2,483,901	£2,468,334	£2,452,658	£2,436,872	£2,420,975	£2,404,967	£2,388,848	£2,372,615	£2,356,269	£2,339,808
	Total			£25,482,182	£25,482,182	£22,165,449	£19,175,010	£16,478,198	£14,045,611	£11,850,790	£9,869,919	£9,817,494	£9,764,701	£9,711,539	£9,658,005	£9,604,096	£9,549,809	£9,495,143	£9,440,094	£9,384,660	£9,328,837	£9,272,624	£9,216,018	£9,159,015	£9,101,613	£9,043,809	£8,985,601	£8,926,985	£8,867,959	£8,808,519	£8,748,664	£8,688,390	£8,627,693
Journey Time Difference																																
	Outbound Business		60.0	5,687,936	5,687,936	4,947,600	4,280,097	3,678,136	3,135,153	2,645,242	2,203,087	2,191,385	2,179,601	2,167,735	2,155,785	2,143,752	2,131,635	2,119,432	2,107,145	2,094,771	2,082,311	2,069,763	2,057,128	2,044,404	2,031,592	2,018,689	2,005,696	1,992,613	1,979,437	1,966,170	1,952,809	1,939,355	1,925,807
	Outbound Leisure		60.0	18,730,321	18,730,321	16,292,403	14,094,322	12,112,068	10,324,030	8,710,757	7,254,746	7,216,211	7,177,407	7,138,331	7,098,981	7,059,356	7,019,453	6,979,272	6,938,809	6,898,063	6,857,031	6,815,712	6,774,104	6,732,205	6,690,013	6,647,525	6,604,740	6,561,655	6,518,269	6,474,579	6,430,583	6,386,279	6,341,665
	Inbound Business		60.0	5,130,355	5,130,355	4,462,594	3,860,525	3,317,573	2,827,818	2,385,932	1,987,121	1,976,567	1,965,938	1,955,235	1,944,456	1,933,603	1,922,673	1,911,667	1,900,584	1,889,424	1,878,185	1,866,867	1,855,471	1,843,994	1,832,437	1,820,800	1,809,081	1,797,279	1,785,396	1,773,429	1,761,378	1,749,243	1,737,023
	Inbound Leisure		60.0	12,377,376	12,377,376	10,766,351	9,313,815	8,003,901	6,822,328	5,756,245	4,794,083	4,768,619	4,742,976	4,717,154	4,691,151	4,664,966	4,638,597	4,612,045	4,585,306	4,558,380	4,531,265	4,503,961	4,476,466	4,448,778	4,420,896	4,392,820	4,364,546	4,336,075	4,307,404	4,278,533	4,249,460	4,220,183	4,190,701
Monetised Journey Time Difference																																
	Outbound Business		£1.11	£6,313,609	£6,441,775	£5,717,068	£5,046,152	£4,424,481	£3,847,876	£3,312,498	£2,814,815	£2,856,701	£2,899,018	£2,941,765	£2,984,937	£3,028,532	£3,072,545	£3,116,972	£3,161,809	£3,207,050	£3,252,690	£3,298,722	£3,345,139	£3,391,935	£3,439,102	£3,486,630	£3,534,513	£3,582,739	£3,631,298	£3,680,180	£3,729,372	£3,778,863	£3,828,639
	Outbound Leisure		£0.19	£3,958,761	£3,631,004	£3,222,512	£2,844,340	£2,493,925	£2,168,914	£1,867,140	£1,586,613	£1,610,223	£1,634,076	£1,658,170	£1,682,505	£1,707,078	£1,731,887	£1,756,929	£1,782,202	£1,807,702	£1,833,428	£1,859,374	£1,885,538	£1,911,915	£1,938,502	£1,965,292	£1,992,282	£2,019,465	£2,046,836	£2,074,389	£2,102,117	£2,130,013	£2,158,070
	Inbound Business		£1.11	£5,694,694	£5,810,296	£5,156,631	£4,551,484	£3,990,755	£3,470,674	£2,987,779	£2,538,882	£2,576,662	£2,614,832	£2,653,388	£2,692,328	£2,731,649	£2,771,348	£2,811,420	£2,851,861	£2,892,667	£2,933,833	£2,975,352	£3,017,220	£3,059,428	£3,101,971	£3,144,841	£3,188,029	£3,231,528	£3,275,327	£3,319,417	£3,363,787	£3,408,426	£3,453,323
	Inbound Leisure		£0.19	£2,351,702	£2,399,441	£2,129,501	£1,879,597	£1,648,037	£1,433,262	£1,233,844	£1,048,466	£1,064,068	£1,079,830	£1,095,753	£1,111,833	£1,128,072	£1,144,466	£1,161,014	£1,177,715	£1,194,566	£1,211,566	£1,228,712	£1,246,002	£1,263,433	£1,281,001	£1,298,705	£1,316,540	£1,334,503	£1,352,591	£1,370,798	£1,389,122	£1,407,556	£1,426,097
Total Diverted Passenger User Disbenefits																																
	Outbound Business			£10,579,560	£10,707,726	£9,427,768	£8,256,225	£7,183,082	£6,199,241	£5,296,430	£4,467,130	£4,500,240	£4,533,719	£4,567,566	£4,601,776	£4,636,346	£4,671,271	£4,706,547	£4,742,168	£4,778,129	£4,814,423	£4,851,044	£4,887,985	£4,925,238	£4,962,795	£5,000,647	£5,038,785	£5,077,198	£5,115,876	£5,154,807	£5,193,979	£5,233,379	£5,272,995
	Outbound Leisure			£14,016,523	£14,088,766	£12,319,103	£10,713,670	£9,256,497	£7,933,164	£6,730,646	£5,637,179	£5,639,274	£5,641,461	£5,643,738	£5,646,103	£5,648,552	£5,651,081	£5,653,689	£5,656,370	£5,659,121	£5,661,937	£5,664,814	£5,667,747	£5,670,730	£5,673,759	£5,676,827	£5,679,928	£5,683,055	£5,686,203	£5,689,362	£5,692,526	£5,695,686	£5,698,833
	Inbound Business			£9,542,460	£9,658,063	£8,503,577	£7,446,878	£6,478,935	£5,591,538	£4,777,228	£4,029,223	£4,059,087	£4,089,285	£4,119,814	£4,150,670	£4,181,851	£4,213,353	£4,245,170	£4,277,300	£4,309,735	£4,342,472	£4,375,503	£4,408,823	£4,442,424	£4,476,299	£4,510,441	£4,544,840	£4,579,487	£4,614,373	£4,649,488	£4,684,820	£4,720,358	£4,756,090
	Inbound Leisure			£9,262,403	£9,310,143	£8,140,714	£7,079,811	£6,116,881	£5,242,396	£4,447,747	£3,725,163	£3,726,547	£3,727,992	£3,729,497	£3,731,059	£3,732,678	£3,734,349	£3,736,072	£3,737,844	£3,739,662	£3,741,523	£3,743,424	£3,745,362	£3,747,334	£3,749,335	£3,751,362	£3,753,412	£3,755,479	£3,757,558	£3,759,646	£3,761,737	£3,763,825	£3,765,905
	Total			£43,400,947	£43,764,698	£38,391,162	£33,496,583	£29,035,395	£24,966,338	£21,252,051	£17,858,696	£17,925,147	£17,992,457	£18,060,614	£18,129,608	£18,199,426	£18,270,054	£18,341,478	£18,413,681	£18,486,646	£18,560,354	£18,634,785	£18,709,916	£18,785,726	£18,862,188	£18,939,277	£19,016,964	£19,095,219	£19,174,010	£19,253,303	£19,333,061	£19,413,248	£19,493,823
Disbenefits per Diverted Passenger																																
	Outbound Business			£111.60	£112.95	£114.33	£115.74	£117.17	£118.64	£120.13	£121.66	£123.22	£124.80	£126.42	£128.08	£129.76	£131.48	£133.24	£135.03	£136.86	£138.72	£140.63	£142.57	£144.55	£146.57	£148.63	£150.73	£152.88	£155.07	£157.31	£159.58	£161.91	£164.28
	Outbound Leisure			£44.90	£45.13	£45.37	£45.61	£45.85	£46.11	£46.36	£46.62	£46.89	£47.16	£47.44	£47.72	£48.01	£48.30	£48.60	£48.91	£49.22	£49.54	£49.87	£50.20	£50.54	£50.89	£51.24	£51.60	£51.97	£52.34	£52.72	£53.11	£53.51	£53.92
	Inbound Business			£111.60	£112.95	£114.33	£115.74	£117.17	£118.64	£120.13	£121.66	£123.22	£124.80	£126.42	£128.08	£129.76	£131.48	£133.24	£135.03	£136.86	£138.72	£140.63	£142.57	£144.55	£146.57	£148.63	£150.73	£152.88	£155.07	£157.31	£159.58	£161.91	£164.28
	Inbound Leisure			£44.90	£45.13	£45.37	£45.61	£45.85	£46.11	£46.36	£46.62	£46.89	£47.16	£47.44	£47.72	£48.01	£48.30	£48.60	£48.91	£49.22	£49.54	£49.87	£50.20	£50.54	£50.89	£51.24	£51.60	£51.97	£52.34	£52.72	£53.11	£53.51	£53.92
Lost 'Stimulated' Passengers																																
	Outbound Business		13.6%	0	0	13,003	24,796	35,501	45,229	54,076	62,133	63,020	63,913	64,812	65,718	66,630	67,549	68,474	69,405	70,343	71,287	72,238	73,196	74,161	75,132	76,110	77,095	78,086	79,085	80,091	81,103	82,123	83,150
	Outbound Leisure		44.7%	0	0	42,817	81,652	116,906	148,938	178,073	204,602	207,523	210,465	213,426	216,409	219,413	222,437	225,483	228,550	231,638	234,748	237,880	241,034	244,210	247,408	250,628	253,871	257,137	260,426	263,737	267,072	270,430	273,812
	Inbound Business		12.2%	0	0	11,728	22,365	32,021	40,795	48,775	56,042	56,842	57,648	58,459	59,276	60,099	60,927	61,761	62,601	63,447	64,299	65,157	66,021	66,891	67,767	68,649	69,537	70,432	71,332	72,239	73,153	74,073	74,999
	Inbound Leisure		29.5%	0	0	28,294	53,958	77,254	98,421	117,674	135,205	137,136	139,079	141,037	143,007	144,992	146,991	149,004	151,030	153,071	155,126	157,196	159,280	161,379	163,492	165,620	167,763	169,922	172,095	174,283	176,487	178,706	180,941
	Total			0	0	95,842	182,771	261,682	333,383	398,598	457,982	464,520	471,104	477,734	484,410	491,133	497,904	504,721	511,586	518,500	525,461	532,472	539,531	546,640	553,799	561,007	568,266	575,576	582,938	590,350	597,815	605,332	612,901
Total Disbenefits to Lost 'Stimulated' Passengers																																
	Outbound Business			£0	£0	£743,298	£1,434,918	£2,079,936	£2,682,969	£3,248,225	£3,779,535	£3,882,527	£3,988,295	£4,096,921	£4,208,488	£4,323,082	£4,440,789	£4,561,701	£4,685,911	£4,813,514	£4,944,608	£5,079,296	£5,217,682	£5,359,872	£5,505,977	£5,656,111	£5,810,390	£5,968,936	£6,131,871	£6,299,323	£6,471,424	£6,648,307	£6,830,111
	Outbound Leisure			£0	£0	£971,255	£1,862,018	£2,680,314	£3,433,393	£4,127,809	£4,769,487	£4,865,214	£4,962,771	£5,062,204	£5,163,562	£5,266,896	£5,372,256	£5,479,695	£5,589,268	£5,701,030	£5,815,040	£5,931,355	£6,050,038	£6,171,150	£6,294,756	£6,420,921	£6,549,714	£6,681,204	£6,815,463	£6,952,565	£7,092,587	£7,235,605	£7,381,700
	Inbound Business			£0	£0	£670,434	£1,294,255	£1,876,042	£2,419,961	£2,929,806	£3,409,033	£3,501,928	£3,597,328	£3,695,306	£3,795,936	£3,899,296	£4,005,465	£4,114,524	£4,226,557	£4,341,652	£4,459,895	£4,581,380	£4,706,199	£4,834,451	£4,966,233	£5,101,650	£5,240,806	£5,383,809	£5,530,772	£5,681,809	£5,837,039	£5,996,582	£6,160,565
	Inbound Leisure			£0	£0	£641,825	£1,230,460	£1,771,206	£2,268,856	£2,727,740	£3,151,774	£3,215,032	£3,279,500	£3,345,207	£3,412,187	£3,480,472	£3,550,096	£3,621,094	£3,693,502	£3,767,357	£3,842,696	£3,919,560	£3,997,988	£4,078,021	£4,159,702	£4,243,075	£4,328,184	£4,415,075	£4,503,796	£4,594,396	£4,686,925	£4,781,435	£4,877,978
	Total			£0	£0	£3,026,811	£5,821,652	£8,407,499	£10,805,180	£13,033,581	£15,109,828	£15,464,701	£15,827,894	£16,199,639	£16,580,174	£16,969,745	£17,368,605	£17,777,014	£18,195,238	£18,623,552	£19,062,240	£19,511,592	£19,971,907	£20,443,494	£20,926,668	£21,421,756	£21,929,093	£22,449,024	£22,981,903	£23,528,095	£24,087,974	£24,661,928	£25,250,354
Producer Benefits																																
Construction Cost		0																														

2081

Option C (i) - Loss of FlyBe LGW																																
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Passengers																																
	Outbound Business	13.6%	121,519	121,519	122,369	123,226	124,089	124,957	125,832	126,713	127,600	128,493	129,392	102,126	102,840	103,560	104,285	105,015	105,750	106,491	107,236	107,987	108,743	109,504	110,270	111,042	111,819	112,602	113,390	114,184	114,983	115,788
	Outbound Leisure	44.7%	400,160	400,160	402,962	405,782	408,623	411,483	414,364	417,264	420,185	423,126	426,088	336,299	338,653	341,023	343,410	345,814	348,235	350,673	353,127	355,599	358,088	360,595	363,119	365,661	368,221	370,798	373,394	376,007	378,640	381,290
	Inbound Business	12.2%	109,607	109,607	110,374	111,146	111,924	112,708	113,497	114,291	115,091	115,897	116,708	92,114	92,759	93,408	94,062	94,721	95,384	96,051	96,724	97,401	98,083	98,769	99,461	100,157	100,858	101,564	102,275	102,991	103,712	104,438
	Inbound Leisure	29.5%	264,434	264,434	266,285	268,149	270,026	271,916	273,820	275,737	277,667	279,610	281,568	222,233	223,789	225,355	226,933	228,521	230,121	231,732	233,354	234,987	236,632	238,288	239,956	241,636	243,328	245,031	246,746	248,473	250,213	251,964
	Total		895,720	895,720	901,990	908,304	914,662	921,065	927,512	934,005	940,543	947,127	953,756	752,771	758,041	763,347	768,690	774,071	779,490	784,946	790,441	795,974	801,546	807,156	812,807	818,496	824,226	829,995	835,805	841,656	847,547	853,480
Diverted Passengers																																
	Outbound Business		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Outbound Leisure		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Business		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Leisure		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Fare Difference																																
	Outbound Business	45.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Outbound Leisure	33.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Business	45.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Leisure	33.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Journey Time Difference																																
	Outbound Business	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Outbound Leisure	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Business	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Leisure	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monetised Journey Time Difference																																
	Outbound Business	£1.11	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Outbound Leisure	£0.19	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Inbound Business	£1.11	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Inbound Leisure	£0.19	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Total Diverted Passenger User Disbenefits																																
	Outbound Business		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Outbound Leisure		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Inbound Business		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Inbound Leisure		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Total		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Disbenefits per Diverted Passenger (assumed same as Do Nothing case for calculation of impact on 'lost' passengers)																																
	Outbound Business		£111.60	£112.95	£114.33	£115.74	£117.17	£118.64	£120.13	£121.66	£123.22	£124.80	£126.42	£128.08	£129.76	£131.48	£133.24	£135.03	£136.86	£138.72	£140.63	£142.57	£144.55	£146.57	£148.63	£150.73	£152.88	£155.07	£157.31	£159.58	£161.91	£164.28
	Outbound Leisure		£44.90	£45.13	£45.37	£45.61	£45.85	£46.11	£46.36	£46.62	£46.89	£47.16	£47.44	£47.72	£48.01	£48.30	£48.60	£48.91	£49.22	£49.54	£49.87	£50.20	£50.54	£50.89	£51.24	£51.60	£51.97	£52.34	£52.72	£53.11	£53.51	£53.92
	Inbound Business		£111.60	£112.95	£114.33	£115.74	£117.17	£118.64	£120.13	£121.66	£123.22	£124.80	£126.42	£128.08	£129.76	£131.48	£133.24	£135.03	£136.86	£138.72	£140.63	£142.57	£144.55	£146.57	£148.63	£150.73	£152.88	£155.07	£157.31	£159.58	£161.91	£164.28
	Inbound Leisure		£44.90	£45.13	£45.37	£45.61	£45.85	£46.11	£46.36	£46.62	£46.89	£47.16	£47.44	£47.72	£48.01	£48.30	£48.60	£48.91	£49.22	£49.54	£49.87	£50.20	£50.54	£50.89	£51.24	£51.60	£51.97	£52.34	£52.72	£53.11	£53.51	£53.92
Lost Passengers																																
	Outbound Business	13.6%	0	0	0	0	0	0	0	0	0	0	0	28,173	28,370	28,568	28,768	28,970	29,173	29,377	29,582	29,789	29,998	30,208	30,419	30,632	30,847	31,063	31,280	31,499	31,720	31,942
	Outbound Leisure	44.7%	0	0	0	0	0	0	0	0	0	0	0	92,772	93,422	94,076	94,734	95,397	96,065	96,737	97,415	98,097	98,783	99,475	100,171	100,872	101,578	102,289	103,005	103,726	104,453	105,184
	Inbound Business	12.2%	0	0	0	0	0	0	0	0	0	0	0	25,411	25,589	25,768	25,948	26,130	26,313	26,497	26,682	26,869	27,057	27,247	27,437	27,630	27,823	28,018	28,214	28,411	28,610	28,810
	Inbound Leisure	29.5%	0	0	0	0	0	0	0	0	0	0	0	61,306	61,735	62,167	62,602	63,040	63,482	63,926	64,374	64,824	65,278	65,735	66,195	66,658	67,125	67,595	68,068	68,545	69,024	69,508
	Total		0	0	0	0	0	0	0	0	0	0	0	207,662	209,115	210,579	212,053	213,537	215,032	216,537	218,053	219,580	221,117	222,664	224,223	225,793	227,373	228,965	230,568	232,181	233,807	235,443
Total Disbenefits to Lost 'Stimulated' Passengers																																
	Outbound Business		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,804,134	£1,840,685	£1,878,149	£1,916,549	£1,955,911	£1,996,261	£2,037,625	£2,080,030	£2,123,504	£2,168,075	£2,213,774	£2,260,631	£2,308,676	£2,357,942	£2,408,461	£2,460,267	£2,513,394	£2,567,879	£2,623,758
	Outbound Leisure		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£2,213,564	£2,242,543	£2,272,095	£2,302,234	£2,332,975	£2,364,332	£2,396,321	£2,428,957	£2,462,258	£2,496,239	£2,530,917	£2,566,310	£2,602,436	£2,639,313	£2,676,960	£2,715,397	£2,754,644	£2,794,720	£2,835,648
	Inbound Business		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,627,277	£1,660,245	£1,694,036	£1,728,672	£1,764,176	£1,800,570	£1,837,879	£1,876,127	£1,915,339	£1,955,542	£1,996,761	£2,039,024	£2,082,360	£2,126,796	£2,172,362	£2,219,090	£2,267,010	£2,316,153	£2,366,554
	Inbound Leisure		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,462,768	£1,481,918	£1,501,446	£1,521,363	£1,541,677	£1,562,398	£1,583,537	£1,605,104	£1,627,110	£1,649,565	£1,672,481	£1,695,870	£1,719,742	£1,744,111	£1,768,990	£1,794,390	£1,820,325	£1,846,808	£1,873,854
	Total		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£7,107,742	£7,225,391	£7,345,726	£7,468,818	£7,594,738	£7,723,561	£7,855,362	£7,990,218	£8,128,211	£8,269,421	£8,413,933	£8,561,835	£8,713,214	£8,868,162	£9,026,773	£9,189,143	£9,355,372	£9,525,561	£9,699,814
Producer Benefits																																
Construction Cost		84,500,000	£42,250,000	£42,250,000																												

2082

Option C (i) - Retain Flybe LGW																															
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Passengers																															
	Outbound Business	13.6%	121,519	121,519	122,369	123,226	124,089	124,957	125,832	126,713	127,600	128,493	129,392	130,298	131,210	132,129	133,054	133,985	134,923	135,867	136,818	137,776	138,741	139,712	140,690	141,675	142,666	143,665	144,671	145,683	146,703	147,730
	Outbound Leisure	44.7%	400,160	400,160	402,962	405,782	408,623	411,483	414,364	417,264	420,185	423,126	426,088	429,071	432,074	435,099	438,144	441,211	444,300	447,410	450,542	453,696	456,872	460,070	463,290	466,533	469,799	473,088	476,399	479,734	483,092	486,474
	Inbound Business	12.2%	109,607	109,607	110,374	111,146	111,924	112,708	113,497	114,291	115,091	115,897	116,708	117,525	118,348	119,176	120,011	120,851	121,697	122,548	123,406	124,270	125,140	126,016	126,898	127,786	128,681	129,582	130,489	131,402	132,322	133,248
	Inbound Leisure	29.5%	264,434	264,434	266,285	268,149	270,026	271,916	273,820	275,737	277,667	279,610	281,568	283,539	285,523	287,522	289,535	291,561	293,602	295,658	297,727	299,811	301,910	304,023	306,152	308,295	310,453	312,626	314,814	317,018	319,237	321,472
			895,720	895,720	901,990	908,304	914,662	921,065	927,512	934,005	940,543	947,127	953,756	960,433	967,156	973,926	980,743	987,609	994,522	1,001,484	1,008,494	1,015,553	1,022,662	1,029,821	1,037,030	1,044,289	1,051,599	1,058,960	1,066,373	1,073,837	1,081,354	1,088,924
Average Fare Difference																															
	Outbound Business	£45.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
	Outbound Leisure	£33.50	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
	Inbound Business	£45.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
	Inbound Leisure	£33.50	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
	Total		£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Journey Time Difference																															
	Outbound Business	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Outbound Leisure	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Business	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Leisure	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Journey Time Difference																															
	Outbound Business	£1.11	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Outbound Leisure	£0.19	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Inbound Business	£1.11	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
	Inbound Leisure	£0.19	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Producer Benefits																															
Construction Cost		84,500,000	£42,250,000	£42,250,000																											

Option E																															
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Passengers																															
	Outbound Business	13.6%	121,519	121,519	122,369	123,226	124,089	124,957	125,832	126,713	127,600	128,493	129,392	130,298	131,210	132,129	133,054	133,985	134,923	135,867	136,818	137,776	138,741	139,712	140,690	141,675	142,666	143,665	144,671	145,683	146,703	147,730
	Outbound Leisure	44.7%	400,160	400,160	402,962	405,782	408,623	411,483	414,364	417,264	420,185	423,126	426,088	429,071	432,074	435,099	438,144	441,211	444,300	447,410	450,542	453,696	456,872	460,070	463,290	466,533	469,799	473,088	476,399	479,734	483,092	486,474
	Inbound Business	12.2%	109,607	109,607	110,374	111,146	111,924	112,708	113,497	114,291	115,091	115,897	116,708	117,525	118,348	119,176	120,011	120,851	121,697	122,548	123,406	124,270	125,140	126,016	126,898	127,786	128,681	129,582	130,489	131,402	132,322	133,248
	Inbound Leisure	29.5%	264,434	264,434	266,285	268,149	270,026	271,916	273,820	275,737	277,667	279,610	281,568	283,539	285,523	287,522	289,535	291,561	293,602	295,658	297,727	299,811	301,910	304,023	306,152	308,295	310,453	312,626	314,814	317,018	319,237	321,472
Average Fare Difference																															
	Outbound Business	45.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Outbound Leisure	33.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Business	45.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Leisure	33.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Journey Time Difference																															
	Outbound Business	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Outbound Leisure	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Business	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Inbound Leisure	60.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Construction Cost		83,400,000																													

NPV Calculations Sheets

Guernsey Airport Cost Benefit Analysis																															
Base Scenario																															
Description																															
	This compares a situation in which the basic upgrades are undertaken to the runway against a situation where nothing is done. This assumes that the runway upgrade enables current traffic to be retained and underlying growth continues in to the future. If nothing is done, only services to Jersey and ALderney are retained. Passengers using other services are either forced to travel to Jersey and then onwards to their destination or simply do not travel.																														
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	
User Benefits (Journey Times and Air Fares saved via expenditure on the runway)																															
Diverted Passengers	£43,400,947	£43,764,698	£38,391,162	£33,496,583	£29,035,395	£24,966,338	£21,252,051	£17,858,696	£17,925,147	£17,992,457	£18,060,614	£18,129,606	£18,199,426	£18,270,054	£18,341,478	£18,413,681	£18,486,646	£18,560,354	£18,634,785	£18,709,916	£18,785,726	£18,862,188	£18,939,277	£19,016,964	£19,095,219	£19,174,010	£19,253,303	£19,333,061	£19,413,248	£19,493,823	
Stimulated Passengers	£0	£0	£3,026,811	£5,821,652	£8,407,499	£10,805,180	£13,033,581	£15,109,828	£15,464,701	£15,827,894	£16,199,639	£16,580,174	£16,969,745	£17,368,605	£17,777,014	£18,195,238	£18,623,352	£19,062,240	£19,511,592	£19,971,907	£20,443,484	£20,926,648	£21,421,756	£21,929,093	£22,449,024	£22,981,903	£23,528,095	£24,087,974	£24,661,928	£25,250,354	
Producer Benefits	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	
Construction Costs	£42,250,000	£42,250,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	
Net Benefit/Cost	£1,150,947	£1,514,698	£41,417,973	£39,318,235	£37,442,893	£35,771,518	£34,285,631	£32,968,524	£33,389,848	£33,820,351	£34,260,253	£34,709,782	£35,169,172	£35,638,660	£36,118,492	£36,608,919	£37,110,198	£37,622,594	£38,146,376	£38,681,823	£39,229,210	£39,788,856	£40,361,034	£40,946,058	£41,544,243	£42,155,913	£42,781,397	£43,421,036	£44,075,177	£44,744,177	
Discount Rate	3.50%																														
Discount Multiplier	1.000	0.966	0.934	0.902	0.871	0.842	0.814	0.786	0.759	0.734	0.709	0.685	0.662	0.639	0.618	0.597	0.577	0.557	0.538	0.520	0.503	0.486	0.469	0.453	0.438	0.423	0.409	0.395	0.382	0.369	
Discounted Benefit/Cost	£1,150,947	£1,463,478	£38,664,121	£35,462,795	£32,629,319	£30,118,658	£27,891,383	£25,912,962	£25,356,637	£24,815,039	£24,287,738	£23,774,317	£23,274,370	£22,787,507	£22,313,347	£21,851,520	£21,401,671	£20,963,451	£20,536,527	£20,120,571	£19,715,267	£19,320,311	£18,935,404	£18,560,260	£18,194,598	£17,838,147	£17,490,647	£17,151,841	£16,821,483	£16,499,338	
Net Present Value	£645,303,644																														
Base Scenario with Loss of Flybe to LGW																															
Description																															
	This compares a situation in which the basic upgrades are undertaken to the runway against a situation where nothing is done. This assumes that the runway upgrade enables current traffic to be retained with the exception of the Flybe service to LGW and underlying growth continues in to the future. If nothing is done, only services to Jersey and ALderney are retained. Passengers using other services are either forced to travel to Jersey and then onwards to their destination or simply do not travel.																														
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	
User Benefits (Journey Times and Air Fares saved via expenditure on the runway)																															
Diverted Passengers	£43,400,947	£43,764,698	£38,391,162	£33,496,583	£29,035,395	£24,966,338	£21,252,051	£17,858,696	£17,925,147	£17,992,457	£18,060,614	£18,129,606	£18,199,426	£18,270,054	£18,341,478	£18,413,681	£18,486,646	£18,560,354	£18,634,785	£18,709,916	£18,785,726	£18,862,188	£18,939,277	£19,016,964	£19,095,219	£19,174,010	£19,253,303	£19,333,061	£19,413,248	£19,493,823	
Stimulated Passengers	£0	£0	£3,026,811	£5,821,652	£8,407,499	£10,805,180	£13,033,581	£15,109,828	£15,464,701	£15,827,894	£16,199,639	£9,472,432	£9,744,395	£10,022,880	£10,308,196	£10,600,499	£10,899,991	£11,206,878	£11,521,373	£11,843,696	£12,174,070	£12,512,735	£12,859,922	£13,215,880	£13,580,862	£13,955,130	£14,338,951	£14,732,602	£15,136,368	£15,550,539	
Producer Benefits	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	
Construction Costs	£42,250,000	£42,250,000																													
Net Benefit/Cost	£1,150,947	£1,514,698	£41,417,973	£39,318,235	£37,442,893	£35,771,518	£34,285,631	£32,968,524	£33,389,848	£33,820,351	£34,260,253	£27,602,040	£27,943,781	£28,292,934	£28,649,674	£29,014,181	£29,386,637	£29,767,232	£30,156,158	£30,553,613	£30,959,796	£31,374,923	£31,799,199	£32,232,844	£32,676,081	£33,129,140	£33,592,254	£34,065,664	£34,549,610	£35,044,362	
Discount Rate	3.50%																														
Discount Multiplier	1.000	0.966	0.934	0.902	0.871	0.842	0.814	0.786	0.759	0.734	0.709	0.685	0.662	0.639	0.618	0.597	0.577	0.557	0.538	0.520	0.503	0.486	0.469	0.453	0.438	0.423	0.409	0.395	0.382	0.369	
Discounted Benefit/Cost	£1,150,947	£1,463,476	£38,664,121	£35,462,795	£32,629,319	£30,118,658	£27,891,383	£25,912,962	£25,356,637	£24,815,039	£24,287,738	£18,905,899	£18,492,728	£18,090,620	£17,699,247	£17,318,292	£16,947,447	£16,586,414	£16,234,904	£15,892,635	£15,559,338	£15,234,750	£14,918,614	£14,610,895	£14,310,723	£14,018,496	£13,733,779	£13,456,354	£13,186,011	£12,922,544	
Net Present Value	£565,872,554																														

Runway Extension Scenario

Description

This compares a situation in which the basic upgrades and runway extension are undertaken to the runway against a situation where nothing is done. This assumes that the runway upgrade enables current traffic to be retained and underlying growth continues in to the future. If nothing is done, only services to Jersey and ALderney are retained. Passengers using other services are either forced to travel to Jersey and then onwards to their destination or simply do not travel.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
User Benefits (Journey Times and Air Fares saved via expenditure on the runway)																														
Diverted Passengers	£43,400,947	£43,764,688	£38,391,162	£33,496,583	£29,035,395	£24,966,338	£21,252,051	£17,898,696	£17,925,147	£17,992,457	£18,060,614	£18,129,608	£18,199,426	£18,270,054	£18,341,478	£18,413,681	£18,486,646	£18,560,354	£18,634,785	£18,709,916	£18,785,726	£18,862,188	£18,939,277	£19,016,964	£19,095,219	£19,174,010	£19,253,303	£19,333,061	£19,413,248	£19,493,823
Stimulated Passengers	£0	£0	£3,026,811	£5,821,652	£8,407,499	£10,805,180	£13,033,961	£15,109,828	£15,464,701	£15,827,894	£16,199,639	£16,580,174	£16,969,745	£17,368,605	£17,777,014	£18,195,238	£18,623,552	£19,062,240	£19,511,592	£19,971,907	£20,443,494	£20,926,668	£21,421,756	£21,929,093	£22,449,034	£22,981,903	£23,528,095	£24,087,974	£24,661,928	£25,250,354
Producer Benefits	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Construction Costs	£42,250,000	£42,250,000	£43,000,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Net Benefit/Cost	£1,150,947	£1,514,688	-£1,582,027	£39,318,235	£37,442,893	£35,771,518	£34,285,831	£32,988,524	£33,389,848	£33,820,351	£34,260,253	£34,709,782	£35,169,172	£35,638,660	£36,118,492	£36,608,919	£37,110,198	£37,622,594	£38,146,376	£38,681,823	£39,229,219	£39,788,856	£40,361,034	£40,946,058	£41,544,240	£42,155,913	£42,781,397	£43,421,036	£44,075,177	£44,744,177
Discount Rate	3.50%																													
Discount Multiplier	1.000	0.966	0.934	0.902	0.871	0.842	0.814	0.786	0.759	0.734	0.709	0.685	0.662	0.639	0.618	0.597	0.577	0.557	0.538	0.520	0.503	0.486	0.469	0.453	0.438	0.423	0.409	0.395	0.382	0.369
Discounted Benefit/Cost	£1,150,947	£1,463,476	-£1,476,839	£35,462,795	£32,629,319	£30,118,698	£27,891,383	£25,912,962	£25,356,637	£24,815,039	£24,287,738	£23,774,317	£23,274,370	£22,787,507	£22,313,347	£21,851,520	£21,401,671	£20,963,451	£20,536,527	£20,120,571	£19,715,267	£19,320,311	£18,935,404	£18,560,260	£18,194,598	£17,838,147	£17,490,647	£17,151,841	£16,821,483	£16,499,333
Net Present Value	£605,162,684																													

Runway Refurbishment followed by extension in 2020

Description

This compares a situation in which the basic upgrades are undertaken to the runway as soon as possible and the runway extension is undertaken in the longer term, becoming available in around 2020, against a situation where nothing is done. This assumes that the runway upgrade enables current traffic to be retained and underlying growth continues in to the future. If nothing is done, only services to Jersey and ALderney are retained. Passengers using other services are either forced to travel to Jersey and then onwards to their destination or simply do not travel.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
User Benefits (Journey Times and Air Fares saved via expenditure on the runway)																														
Diverted Passengers	£43,400,947	£43,764,688	£38,391,162	£33,496,583	£29,035,395	£24,966,338	£21,252,051	£17,898,696	£17,925,147	£17,992,457	£18,060,614	£18,129,608	£18,199,426	£18,270,054	£18,341,478	£18,413,681	£18,486,646	£18,560,354	£18,634,785	£18,709,916	£18,785,726	£18,862,188	£18,939,277	£19,016,964	£19,095,219	£19,174,010	£19,253,303	£19,333,061	£19,413,248	£19,493,823
Stimulated Passengers	£0	£0	£3,026,811	£5,821,652	£8,407,499	£10,805,180	£13,033,961	£15,109,828	£15,464,701	£15,827,894	£16,199,639	£16,580,174	£16,969,745	£17,368,605	£17,777,014	£18,195,238	£18,623,552	£19,062,240	£19,511,592	£19,971,907	£20,443,494	£20,926,668	£21,421,756	£21,929,093	£22,449,034	£22,981,903	£23,528,095	£24,087,974	£24,661,928	£25,250,354
Producer Benefits	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Construction Costs	£42,250,000	£42,250,000	£0	£0	£0	£0	£0	£0	£0	£0	£43,000,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Net Benefit/Cost	£1,150,947	£1,514,688	£41,417,973	£39,318,235	£37,442,893	£35,771,518	£34,285,831	£32,988,524	£33,389,848	£33,820,351	-£8,739,747	£34,709,782	£35,169,172	£35,638,660	£36,118,492	£36,608,919	£37,110,198	£37,622,594	£38,146,376	£38,681,823	£39,229,219	£39,788,856	£40,361,034	£40,946,058	£41,544,240	£42,155,913	£42,781,397	£43,421,036	£44,075,177	£44,744,177
Discount Rate	3.50%																													
Discount Multiplier	1.000	0.966	0.934	0.902	0.871	0.842	0.814	0.786	0.759	0.734	0.709	0.685	0.662	0.639	0.618	0.597	0.577	0.557	0.538	0.520	0.503	0.486	0.469	0.453	0.438	0.423	0.409	0.395	0.382	0.369
Discounted Benefit/Cost	£1,150,947	£1,463,476	£38,684,121	£35,462,795	£32,629,319	£30,118,698	£27,891,383	£25,912,962	£25,356,637	£24,815,039	-£6,195,771	£23,774,317	£23,274,370	£22,787,507	£22,313,347	£21,851,520	£21,401,671	£20,963,451	£20,536,527	£20,120,571	£19,715,267	£19,320,311	£18,935,404	£18,560,260	£18,194,598	£17,838,147	£17,490,647	£17,151,841	£16,821,483	£16,499,333
Net Present Value	£614,820,135																													

2085

Appendix 4

Guernsey Airport Pavements Rehabilitation – Project Scope (Section 3.10 - Billet D'Etat XVIII –December 2008)

Project Scope

In summary, the scope of the works has been defined as follows:

a) Replace the hard surfaced pavements with new durable runway, taxiway and apron pavements to upgrade the load bearing capacity, surface friction and profiles of these pavements.

b) Provide additional paved areas to facilitate the proposed pavement reconstruction.

c) Replace the Airfield Ground Lighting (AGL).

d) Replace and upgrade all signage and markings.

e) Provide Runway End Safety Areas (RESAs) to meet as closely as is practicable the current Civil Aviation Authority (CAA)/International Civil Aviation Authority (ICAO) requirements and to provide mitigation if the full requirements cannot be achieved.

f) Re-grade the runway strip to comply with the CAA/ICAO requirements.

g) Provide new fencing and crash gates as necessary.

h) Provide emergency access tracks as necessary.

i) Provide civil infrastructure in readiness for security check points.

j) The runway proposals are to include a review of further options for the correction of any deficiencies in vertical alignment (undulation).

k) The runway proposals are also to include consideration of the potential for runway extension to 1700m.

l) Replacement/rehabilitation of the existing drainage system as necessary.

m) Incorporate drainage to cater for future airside pavement developments as appropriate.

n) Upgrade the drainage system to incorporate pollution control as necessary.

o) Consideration to the advantages/disadvantages of moving from self manoeuvring aircraft parking stands to nose-in/push-back options.

p) Consideration for the installation of fixed electrical power at head of stands. Alternatively for the provision of ducting for this so that cabling could be installed at a later date.

Appendix 5

ENVIRONMENT DEPARTMENT

Deputy B Flouquet
Minister
Public Services Department
Sir Charles Frossard House
La Charroterie
St Peter Port

13th August 2009

Dear Deputy Flouquet

GUERNSEY AIRPORT – DRAFT STATES REPORT ON AIRPORT PAVEMENTS REHABILITATION

I refer to your letter dated 16th July 2009 and also to the draft States Report referred to above, both of which were considered by the Environment Board on 11th August 2009.

Your letter requests a written opinion on the options presented and a general view of whether the proposals would fall within the relevant policy gateway without the need for a planning inquiry.

The Board declined to express an opinion on the various options considered in order to maintain its impartiality in relation to any eventual planning application that it may be required to determine.

The Board carefully considered the options in relation to the Policy RD1 of the Rural Area Plan (Review No. 1) and concluded that this provides a policy gateway for the development. This will enable the Department to consider an application without the need for a formal amendment to the Rural Area Plan.

This policy provides a policy gateway for "essential development" under specified circumstances. The policy provides a framework to ensure that the choice of location of such development can be clearly justified and that the proposals represent the best practicable environmental option through studies such as a Rural Planning and Design Statement, Traffic Impact Assessment and Environmental Impact Assessment. This policy, together with the Environmental Impact Assessment requirements of the Land Planning and Development (Guernsey) Law, 2005 will enable the Board to ensure that all relevant environmental implications will be considered, in order to fulfil the conservation and enhancement policies of the Rural Area Plan.

I understand that you will seek the opinion of St James' Chambers on the Board's considered view. My Board requests that this letter and written advice of St James' Chambers be attached to the States Report, so that both are available to the States when they consider this matter.

Yours sincerely

Peter Sirett
Minister

(NB The economic analysis commissioned by the Policy Council has underlined the vital importance of the airport as a fundamental strategic link for Guernsey's economy and residents. That analysis also concluded that it was unnecessary to extend the airport at this stage but that any development should be 'future proof' to ensure that, if an extension is required in the medium term (10-15 years), there will be minimal additional cost. The Public Services Department's chosen option meets this criteria. Given the critical requirement to ensure continued and continuing air connectivity for the Island, the proposed works should be progressed without further delay. By a substantial majority the Policy Council therefore fully supports the report and its proposals.

In making the above comment the Policy Council had not had the opportunity to consider the Treasury and Resource Department's letter of comment dated 27th August 2009, set out below, in which the Department states that it cannot support the approach being taken by the Public Services Department in seeking States approval to a budget allocation as opposed to bringing the project back to the States for final approval, following detailed design and market testing using competitive tendering. This issue will need to be considered by the States when the Report is debated by the States.)

(NB The Treasury and Resources Department's comments are set out below)

The Chief Minister
Policy Council
Sir Charles Frossard House
La Charroterie
St Peter Port

27th August 2009

Dear Sir

Public Services Department – Guernsey Airport Rehabilitation

The Treasury and Resources Department acknowledges that an operational airport is an essential and highly strategic part of the Island's infrastructure. As such it recognises the importance of ensuring that the airport runway and taxiways are maintained in accordance with recognised international standards.

However, what the Treasury and Resources Department **cannot** support is the approach being taken by the Public Services Department in seeking States approval to a budget allocation as opposed to bringing the project back to the States for final approval, following detailed design and market testing using competitive tendering.

The approach being taken by the Public Services Department shows disregard for the process outlined by the Treasury and Resources Department in its report to the States (Billet D'Etat IX, 2009) on Capital Prioritisation for the approval and management of capital projects, namely:-

> *"The inclusion by the States of a proposal in the capital programme does not mean that the project is able to commence. Once it has been agreed by the States that a Department's proposal is to be included within the programme for capital funding it should be treated as a project and managed following the Code of Practice guidance on "Gateway Review, Project Management and Post Implementation Review" issued by the Treasury and Resources Department."*

In summary the agreed process includes the following essential actions:-

(a) The establishment of a Project Board appropriately constituted for the project. For larger and more complex projects, this should include political representatives from the sponsoring Department and the Treasury and Resources Department.

(b) The Project Board is charged with overall responsibility for whole projects including (but not limited to) compiling a budget to cover design fees, investigations, surveys, enabling works, etc and the costs of conducting a tender exercise.

(c) The release of funds to progress the project to tender stage is subject to the project progressing satisfactorily through Gateway Reviews. These high-level Gateway Reviews are carried out before key decisions are made in the procurement of a project and provide assurance that the project continues to have merit, that it continues to be justified on a business need basis with an assessment of the likely costs, risks and potential for success compared to the original brief.

These steps should be undertaken prior to the project being brought back to the States.

The Gateway Reviews are a very important part of the process. The outcome of these reviews on the Airport Pavements project would be used to inform the Treasury and Resources Department's Letter of Comment which would be appended to the States Report produced by the Public Services Department. The letter would summarise any issues arising from the outcomes of the Gateway Reviews. Importantly to date only some of this essential work has yet been actioned.

Considerable work has been undertaken following the Wales Audit Office Report, including the development of robust Codes of Practice to significantly reduce the risk of project creep and overspend that has previously occurred on some large projects such as the New Jetty, and the Airport Terminal Building.

The Public Services Department is seeking to circumvent these essential steps.

The Treasury and Resources Department is of the firm opinion that the States as a whole should make the final decision to approve the Airport Pavements Project. The States can only make this important decision with confidence when the project has been subjected to due process, the scope of the works has been fully detailed, designed and tendered and all costs are known.

Yours faithfully

C N K Parkinson
Minister

The States are asked to decide:-

XI.- Whether, after consideration of the Report dated 30th July, 2009, of the Public Services Department, they are of the opinion:-

1. To approve the upgrade to the Guernsey Airport runway to meet safety requirements as outlined above in this report in configuration with the "Option C" proposal, including the provision of RESAs of 240m (west) and 198m (east).

2. To approve other renovation and rehabilitation works to the Guernsey Airport pavements and associated areas, in addition to the runway works, as detailed in paragraph 1.7 and summarised as follows:

    - Resurfacing of the aprons
    - Resurfacing and realignment of the taxiways
    - Replacement of the airfield ground lighting system and relocation of navigational aids
    - Improvements to foul and surface water drainage
    - Minor miscellaneous items, e.g. foundations for security huts, security fencing, etc.
    - Contingency sums, fees etc.

3. To approve the following list of contractors to be invited to tender:

    Costain Limited
    Edmund Nuttall Limited
    Fitzpatrick Contractors Limited
    Lagan Construction Limited
    Trant Construction Limited

4. To authorise the Treasury and Resources Department to approve a capital vote for the runway and associated pavement rehabilitation works at a cost not exceeding £80.9m.

5. To authorise the Treasury and Resources Department to approve the appointment of the Public Services Department's recommended contractor and to approve other professional services in connection with these works.