

SUPPORTING COMMERCIAL SPACEPLANE OPERATIONS IN THE UK

Response on behalf of Highlands
and Islands Enterprise

3rd October 2014



Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

EXECUTIVE SUMMARY



A handwritten signature in black ink, appearing to read 'Alex Paterson'.

Alex Paterson, Chief Executive

Highlands and Islands Enterprise (HIE) welcomes the opportunity to respond to this important consultation on the criteria to determine the location of a UK spaceport. Our formal response is appended to this letter however, in addition to those questions set out in the consultation document we would wish to provide some additional thoughts, context and information.

HIE is a Scottish Government agency with a remit to lead regional growth and development, to seek investment opportunities that will be a catalyst for change, and to ensure that the Highlands and Islands derives maximum benefit from existing and emerging opportunities. The region for which we are responsible – the north west of Scotland – covers over half the Scottish landmass and incorporates almost 100 inhabited islands, but home to less than 10% of the population, making it by far the most sparsely populated region in the UK.

While we note that four of eight short-listed sites are in the Highlands and Islands we would not wish to choose between them at this stage, but would offer some thoughts on wider issues for consideration in the process towards final selection of a site within the UK. In particular we would view the development of a UK spaceport as an opportunity to develop a new sector of the economy, to regenerate and grow one of the relatively peripheral communities that will host this new facility.

The preferred site selected through this process should fulfil the UK's spaceport needs in the medium to long term, and not merely meet the immediate, short term requirements. Selecting the right site at this stage will allow a strategic programme of investment to be planned and enacted over a decade or more, providing the hard (and soft) infrastructure required to develop an academic and industrial campus on the scale required to ensure the UK is a world leader in space related science and technology in the long term.

The criteria used to identify the eight sites in the consultation, and the conclusions drawn from the process to this point appear to us to be sound. Further development of selection process should consider the operating requirements of the facility, the capabilities and requirements of users, and the wider economic infrastructure required to ensure the venture is successful in the longer term. The role a spaceport can play as a driver of growth is not explicitly evident in the consultation document and we would recommend strongly that this component is given additional weighting once the list has been narrowed down to those that best meet the core operational criteria already identified.

The criteria proposed by the CAA set minimum standards for operating successfully, and that further development of the spaceport concept may require these to be reviewed. In particular, the capability to extend the runway well beyond 3,000m is a key consideration when operating fully in the 2030 timescale. There will also be requirements for specialised handling facilities for payloads, hazardous propellants and appropriate stand-off distances from these.

Segregated airspace for the spaceport should be as generous as possible to cater for spaceplane flight profiles, taking into account the EU Open Skies initiative.

Environmental impacts resulting from spaceport operations will require to be considered and mitigated during the planning phase. Establishment of a spaceport should be on a site where there are already established and trusted links with regulatory agencies.

The primary concern for a successful spaceport will be public safety. Sites will need a level of coordinated response from external agencies which can build on existing facilities and experience.

Space tourism is likely to be a significant economic driver for early development of the spaceport. Existing tourism facilities and the locale should be sufficiently attractive to attract and satisfy the first space tourists who are likely to be high-spending and highly demanding individuals. The spaceport must be capable of offering an integrated package of experience for the most discerning tourist. In the longer term science will create greater demand and impact than tourism, and it will be vital to establish a spaceport capable of exploiting the mass launch market being driven by ever increasing demand for launching small payloads which can be met with Low Earth Orbit launch vehicles, as well as long haul passenger travel.

In order to achieve maximum speed of development with the largest possible economic impact, we believe that a campus approach would bring great benefit. We have identified the following as reasons for this conclusion:

- A space related campus that can build on an established and stable regional growth strategy would enhance the economic, environmental and social benefits to be achieved
- It will create the ability to organise for national and regional growth rather than local development
- Bring academic and businesses together in a mutually supportive cluster
- It will provide an established and proven organisation for community engagement and communication
- The campus approach brings the ability to integrate a space related initiative with other economic themes within the same geographical area in order to generate disproportionate market growth potential (as in the combination of space and life sciences)
- Improves access to a regional skills base and supply chain infrastructure, including serviceable intermodal transportation networks
- Provides an environment for diversification of regional economies
- Gives easier access to the central Government or EU funding that will be required

- Provides sufficient real estate for the campus to grow with the least possible carbon footprint
- Creates enterprise oriented culture in which regional development authorities are able to enter consortia with commercial concerns.

We have given consideration to the request for advice on comparative weighting of selection criteria, but feel that there are so many variations and dependencies that applying weighting to each criterion at this early stage would not be helpful.

In conclusion, Highlands and Islands Enterprise is very interested in the opportunity this exciting venture could bring. We are ready and willing to meet with UK Government officials to discuss in detail our views and the role we could play in maximising the impact of spaceplane operations in the UK.

OUR RESPONSE TO THE CONSULTATION

Highlands and Islands Enterprise (HIE) is grateful for the opportunity to provide a response to the DfT's Consultation on criteria to determine the location of a UK spaceport following the recent CAA Review of spaceplane operations¹.

HIE is a Scottish Government Agency, having a remit to lead regional economic and community development, to seek investment opportunities that will be a catalyst for change, and to ensure that the Highlands and Islands Region derives maximum benefit from existing and emerging opportunities. We work in a diverse region which extends from Shetland to Argyll, and from the Outer Hebrides to Moray, covering more than half of Scotland's land mass. Four of the hitherto downselected sites, Campbeltown Airport, Kinloss Barracks, RAF Lossiemouth and Stornoway Airport, lie within our region.

OUR APPROACH

Despite having a number of contending sites in our sphere of influence, in preparing this submission HIE has adopted a strategic, impartial and holistic approach, and will not recommend to DfT any particular course of action, or any particular site for downselection. Whilst acknowledging the criteria developed to create the extant eight potentially feasible locations we seek to assist the DfT, CAA, UKSA and BIS in developing some top level themes aimed at examining the delivery of maximum possible economic growth and diversification presented through the UK spaceport opportunity. In addition we will provide commentary on the selection criteria already established in HMG's formative strategy documents. These tenets will apply to any of the eight sites; only one strand, which is the residual need to provide vertical launch capabilities, point to a 'North Scotland centric' solution, which has already been identified as such by the CAA.

Drawing on our experience in economic development, through formative dialogue with the Satellite Applications Catapult, and through analysis of case studies (principally the Space Florida and Spaceport Nevada initiatives) our main thrust in this submission is that HMG needs to consider carefully how to develop an economic growth platform, triggered by the spaceport, that will progressively develop and serve the 2030 time scale set out at page 30 of the CAA Review, rather than look to quick, but strategically incoherent, wins in the nearer term. By this we mean that the site selected, rather than be an end in itself, will only be a focal point of an extended science

and technology, academic and industrial campus, that will be served by a hinterland of communities linked together by intermodal transport systems, that will require healthcare and education facilities, accommodation and ready access to other parts of the UK and Europe.

We acknowledge that there is a journey to be undertaken and the near term goals, driven more than likely by operators such as Virgin Galactic and XCOR, that will demand relatively mature infrastructure and a well-honed 'tourism experience' servicing the '5*+' market; but this should not become a sole focus; rather this need should be folded into the longer term plan and afforded the appropriate levels of risk.

As the programme progresses, we intend engaging with the Future Cities and Transport Systems Catapults in the near term to identify how the spaceport programme can benefit from a wider technology capture, or indeed provide opportunity for deployment of emerging national capabilities emanating from the Catapult programme.

Staying with that strategic perspective, our instinct is that we need to adopt this wide field approach to generate the greatest possible share in future global markets stemming from the increasing commoditisation of space, which includes a 'low cost access to space' component, and do this whilst potential national competitors have their resources focused on not only the International Space Station, but also larger satellites. This trend to commoditisation has been identified in HMG's Space Innovation and Growth Strategy² (IGS) as a highly probable market trajectory and is identifiable through the emergence, for example, of Cubesat systems (the US have developed Operationally Responsive Space to deliver, inter alia, "assured space power focussed on timely satisfaction of Joint Force Commander's needs"³). It is a paradigm in which the current satellite market dynamic of 'supplier push' will transform to that of 'demand led' in which there will be an ever increasing market for smaller satellites (nominally, but not exclusively, in the 25kg to 50kg range) working together in larger numbers of constellations.

This paradigm shift in buyer behaviour (let alone the complexities placed upon capability providers) will lead to difficulties in market analysis, but we believe that all parties should be prepared to recognise that the effective management of market risk will drive the large scale spaceport opportunity with purpose.

In general terms our view is that the UK should commit early and resolutely to a single spaceport hub, seeking early mover advantage, and providing confidence to investors-in-waiting by 'thinking big' and avoiding any nuances of interim solutions. By taking this holistic approach the dependencies that will no doubt develop and evolve during the journey from today through to 2030 and beyond will be more easily managed, and situations which limit the spaceport's growth potential, such as those represented by Heathrow's current under-capacity for example, will be more easily identified in good time and mitigated. Key to this long-term success is effective stakeholder engagement that demonstrate the benefits for all direct (for example aerospace) and indirect (for example life sciences) industries and the development of an integrated support infrastructure (for example logistics).

We are therefore adopting a standpoint of a 'campus' approach in which the spaceport will be a catalyst for the development of a supporting cast of potentially many thousands of people, involved in both the 'upstream' delivery of space travel from a spaceport, but also involved in the 'downstream' exploitation of the new capability which could become the de-facto Mainland Europe launch facility.

We note that there is little information available in the CAA reports about the scale of the accessible global market related to upstream space triggered by a spaceport entity, nor of the downstream benefits to supporting industries and off-shooting ventures. Research shows that there are few authoritative references to economic benefits relating to a spaceport, but we are very happy to point to the IoD's Infrastructure for Business paper "Space: Britain's New Infrastructure Frontier"⁴ and more recently the work⁵ by the Satellite Applications Catapult working with Oxford University's Said Business School which analyses commercial demand for satellites and related services, and which provides the following salient points, inter alia:

- A spaceport and co-located research facilities will create high value employment in various areas of space related technologies and manufacturing
- Predicted employment multipliers will be high (3.5). The Mojave Air and Space Port case shows a multiplying effect of 1:100 in relation to employees at the spaceport (30) and the high value employees in the new local space-industry eco-system (3,000)
- Collaboration with universities and research centres will drive additional benefit

- A baseline of £320M of cumulative additional economic activity is expected
- Indirect and induced positive effects created through tourism and R&D activity
- A requirement for some Government funding for spaceport infrastructure development

Observation of the CAA Reports suggest that an economic development theme is not yet fully developed within HMG, but our belief is that it should become more important as the selection process continues. We also believe that other national strategies, such as reducing the impact on the environment (such as through reduction of carbon footprint both in campus build and in running the various facilities) need to be considered carefully early in the process.

Our analysis of the established criteria, and also the potential criteria surrounding economic development, thus suggests that an integrated approach to downselection should be adopted by the selection panel which combines both functional needs of the spaceport, recognising the short term needs over longer term potential and development, whilst aligning these with an economic growth path. For the purposes of our analysis we have found the following grouping, which are closely interlinked, has helped in our deliberations:

Operating Related Criteria: These have to do with the facilities and conditions required for spaceplane launches, recoveries, maintenance and turn-around (for example runways, airspace, meteorological conditions and management of the environmental lobby).

Operations Related Criteria: These have to do with the various capabilities that spaceplanes will deploy (delivery of satellites to orbit, space tourism and so on).

Economic Related Criteria: These have to do with maximising economic impact of the spaceport programme (in which we include 'sufficient real estate to grow', transportation, and others).

OPERATING RELATED CRITERIA

Our main observation is that the CAA documents made available so far have ample descriptions of Operating Related Criteria, and we would not thus argue against the conclusions of the downselection to this point. In essence, the criteria represent a 'minima'. We would, however, take the opportunity to highlight five points.

REGULATION

It is critical that a fledgling enterprise such as a spaceport is supported in its development with the requisite policy and regulation; there must be compliance to an appropriately burgeoning suite of governance that affords safe development and interoperability with other operators and nations. We therefore welcome the adoption of FAA principles and regulation whilst acknowledging that as our experience and knowledge grows, so too will the requisite governance regime within the UK; the key issue is to remain aligned with partner nations and operators to ensure that we adopt best practice and afforded the safest possible operating environment in which operations can garner the greatest benefit. It is critical that other nations recognise the regulatory regime in which the UK spaceport has been constructed and will subsequently operate.

AIRSPACE

Section 2 of the CAA Review document provides some high level information on the types of spaceplane currently under development, but there is little detailed description of the associated airspace requirements for launch, atmosphere re-entry and recovery.

For safety reasons, we agree that the availability of segregated airspace is a key area in the selection criteria, particularly in light of the EU's Open Skies⁶ initiative which looks to move away from fixed airways and terminal control zones, towards a highly coupled and integrated environment in which individual flight paths are allocated/ chosen according to the unique requirements of both aircraft in transit and destination. We have taken expert advice which suggests that the segregated airspace sought for the spaceport in the first instance should be as generous as possible to cater for potential spaceplane flight profiles (particular those associated with re-entry from true orbit) as we understand that regulatory processes behind Airspace reallocations can take considerable time. We thus countenance against 'penny packeting' requests to national airspace authorities. Notwithstanding the Open Skies initiative, the general stance we suggest is that the airspace allocation should be as far away from regular transit routes and control zones as possible, to avoid confliction/interference with conventional aircraft operations.

In addition to the segregated airspace around the spaceport facility itself, due cognisance should also be made for the 'range' over which future orbital (rather than sub-orbital)

spaceplanes will fly as they climb to altitude. As these trajectories are characteristically West to East to take advantage of the rotation of the Earth in achieving escape velocity, a safety assessment needs to be made of what hazards may be presented to the uninvolved general public under those higher flight paths, particularly during any experimental period of a particular spaceplane's lifecycle when there is higher probability of mishap; it is unlikely that spaceplanes will move from experimental status until significant data and performance information has been captured. Hence spaceplanes will not be able to operate at a risk level that is As Low As Reasonably Practicable (ALARP) in the near term and policy and regulation need to reflect this if industrial enterprises are to develop within the UK at an uninhibited pace.

ENVIRONMENTAL MANAGEMENT

Our research with groups who operate large and noisy aircraft close to environmentally sensitive sites suggests that environment and ecological concerns will need addressing early, and best done through established and trusted links with the environmental lobby and/or established Government Agencies⁷. The pacing factor of first operation of a sub-orbital vehicle in 2018 represents an aggressive timescale; planning (with concomitant appeals), as experienced elsewhere, could represent a significant challenge if this risk is not managed with a deft hand and full stakeholder engagement.

GEOGRAPHICAL FACTORS – METEOROLOGY AND LATITUDE

It has been difficult to assess the effects of weather on spaceplane operations without insight into the flight profiles for each craft, for example the permitted degree of crosswind component which thus establishes the importance of having a main runway that points into the prevailing wind. Our general analysis shows weaknesses and strengths of the various sites generally counterbalance each other and that meteorological considerations are therefore not an overriding factor in site selection.

We have also taken advice from a large space 'prime' relating to whether the geographical latitude of a spaceport would impose any limitations on the orbits available for a future orbital spaceplane deploying satellites. Once again, a number of factors pertain relating to the satellite missions, but there is little to differentiate the sites, which range from 50 degrees North to 58 degrees North.

VERTICAL LAUNCH

Our research suggests that there will always be a requirement for vertical launch capability that will service the requirements of a variety of payloads (predominantly voluminous and/or of high mass) seeking particular orbits that are inaccessible to spaceplanes (no matter the launch latitude). The CAA Review points to Northern Scotland as the only general location feasible for this additional activity, but SSTL's unpublished report (to which the CAA refers) shows that a great deal of real estate (64 square kilometres) is required for a vertical launch facility. We consider that several of our site options do have potential for consideration.

INCIDENT RESPONSE

The CAA Technical Report is clear that spaceplanes will undergo a period when operations are at much higher risk than, say, current commercial air travel (a limitation which we coincidentally assess will inhibit the very high speed terrestrial point-to-point market for a considerable time). Although the degree of risk is yet to be established, we also foresee extra risks in the storage and transportation of propellants, payloads and other hazardous materials. To mitigate these additional risks, we predict that sites will need a level of coordinated response from external agencies to augment on-site incident management capability; the way that this contingency is constructed, management, maintained and resourced will need some degree of appraisal – it is in our view a significant challenge.

OPERATIONS RELATED CRITERIA

We are in agreement with the Catapult's valuable analysis on the future commercial demand for space related goods and services and align wholeheartedly with its economic catalyst theme based on a broad variety of missions. We are thus somewhat concerned with the apparent emphasis, made in the CAA Review, on space tourism as a main market driver, but with no countervailing emphasis on the longer term potential satellite launch market (i.e. small payload launch and low cost LEO launch vehicles as set out in the IGS). We entirely agree that there should be some early and tangible focused activity on capturing some of the global space tourism market in the 2018 timescale, but we believe that our economic sights should be more ambitious and set on exploiting the mass launch market being driven by an ever increasing market demand for space derived applications and capability.

We thus recommend that there is a rebalancing of emphasis from this point, with the advent of the space tourism market being identified as a pacing factor (providing a tangible and measurable point on a long journey) that brings together the spaceport concept at a single and inalienable location, but with the parallel development of a clear Vision for the 2030 timescale and beyond. This Vision is what is needed to energise the investment cadre early which we believe to be of great importance for obvious reasons.

²Space Innovation and Growth Strategy – November 2013
³Operationally Responsive Space: <http://ors.csd.disa.mil/mission/>

ECONOMIC RELATED CRITERIA

Whilst we hope that the points made so far have been helpful, our dialogue now turns to economic aspects which reflects our role in the development of regional growth, and which builds on our experience in the oil and gas, and offshore renewable sectors. We note that the CAA Review is reasonably explicit on the requirement for accessibility for employees and visitors, who would require accommodation in the vicinity, and that good transportation would be required.

In order to shift focus on to delivering broad social and economic benefits at the greatest possible speed thereby enhancing growth, and present a logical choice to potential investors-in-waiting, we would considerably enhance the economic criteria and suggest the development of a number of further themes.

We strongly suggest that the site chosen must rapidly become part of an established regional level growth platform which already has the following:

- An established and stable Regional growth strategy that could be enhanced or (at the minimum) de-risked, by the establishment of a space related 'campus'
- An ability to organise for national and regional development rather than simply the local
- An established and proven organisation for community engagement and communication, such as in relationships between local government and infrastructure providers, and with the environmental lobby
- The ability to integrate a space related initiative with other economic themes within the same geographical area in order to generate disproportionate market growth potential (as in the combination space and life sciences for example)
- The presence of an inherent (or latent) skills base, and a supply chain infrastructure, including serviceable intermodal transportation networks
- The requirement for diversification away from other regional sectors which have reached market maturity or are in a planned state of drawdown

- Ready access to the central Government or EU funding that will be required
- The presence of sufficient real estate for the campus to grow at pace (which might be considerable) without causing an overly increased density of population that will, in itself, run against the spaceport risk management philosophy
- The ability to build and operate the broad campus with the least possible carbon footprint
- An enterprise oriented culture in which regional development authorities are able to enter consortia with commercial concerns
- The ability to coordinate extended or federated supply chains

DfT's consultation call asks for specific comment on a number of factors and asks for advice on comparative weighting. These factors are:

- Advancement of science and innovation
- Growth of the space or aerospace sector including stimulating jobs in the wider supply chain or supporting existing space clusters
- Synergy or support to existing economic usage of the spaceport location
- Promotion of high level skills
- Spin off benefits such as tourism or other jobs related to spaceplane operations
- Deliverability

On this point we would agree that all these are valid issues for consideration, but we would countenance against, at this time, arriving at any specific conclusions as to comparative weight. Our experience, particularly in the oil and gas, renewables, and life sciences sectors, suggests that simple weighting of individual factors (and which relate to stovepiped sectorial economic growth) runs the risk of incorrect assumptions regarding the future behaviour of a regional economic ecosystem as a whole. In our campus philosophy we are thus increasingly adopting evidence based approaches that look at a 'system of systems' level analysis, which can make comparative judgements of the relationship of a large range of factors, illustratively between a number of industrial sectors and the influences of local community infrastructure.

Simply put, the noble ambition, above, to promote high level skills may have a critical dependency on planning applications for the housing that will accommodate the higher skilled (and we thus anticipate aspirational) workforce, who may have insufficient support from a local healthcare system that is trying to catch up! In this spaceport programme there undoubtedly will be a complex set of interdependencies that needs to be developed and understood, accompanied by a chronology of coherent action, that then appropriately determines the relevant execution and delivery.

We would thus contend that all of the DfT's factors are highly important for different reasons at different times, but would strongly countenance against making early conclusions within an artificially imposed and narrow economic ambit. The key point here is that to make the highest possible economic impact, the higher the level of complexity in managing the needs and wants of an ever increasing community of interest; we suggest that the management of complexity thus holds the real key to adopting the lowest possible approach to economic risk – whilst creating the greatest opportunity for success.

⁶Space: Britain's New Infrastructure Frontier – May 2012

⁷Spaceport UK: Forging Ahead with Commercial Confidence – September 2014

⁸The US are addressing this issue under the title Next Generation Air Transportation System

⁹In Scotland there is the Scottish Environmental Protection Agency (SEPA) SEPA protects and improves the environment in a number of ways. This includes helping customers to understand and comply with environmental regulations and to realise the many economic benefits of good environmental practice. This approach benefits the environment and the economy, and means we can focus our resources (including our enforcement powers) on tackling the greatest environmental threats.

SUMMARY

At Annex we have supplied direct responses to DfT's Consultation questions, which should be read as supplementary to our substantive position which we have thus far described. We would point out that in providing our 'operating' level analysis we have also drawn on the experience of those consulted who were responsible for harmonising the operation, by day and night, of large and noisy air vehicles with the concerns of the uninvolved general public, and particularly the environmental groups whose influence on future events should not be underestimated.

We have stressed the importance of a regional economic perspective of a spaceport, and we suggest that development agencies or equivalents are fully involved in the next stage of downselection by helping their respective charges align site-specific criteria with higher economic objectives, they are unlikely to do this on their own. National and regional governments and agencies have access to funding sources, that the sites on their own do not; they have the wider view on regional economic needs including the harmonisation of intermodal transportation systems, pressure on public services including health and education, caused by an influx of new inhabitants, and are able to manage the interface with Central Government and EU on key issues such as taxation and regional development assistance. Regional agencies are more likely to be able to develop direct international linkages that would channel enhanced levels of inward investment.

To achieve a maximum level of exploitation, by which we mean that the UK facility will have the best chance of becoming the de facto European launch⁸ hub servicing any number of 'spoke' operating sites, the UK needs to work faster than other potentially competing nations and to grab the greatest possible market share through first mover advantage. Whilst other nations' resources are focused on ISS (which may run on until

2028), there is a window of opportunity available for UK to lay claim to commoditised space launch in the Western European land mass; the UK has the technology, the understanding, the facilities, the infrastructure and commitment. Both our instinct and deductions suggest that the spaceport decision needs to be made quickly along current intentions, using the extant criteria but with the addition of those to do with economic development, and this process occurs at pace, and demonstrably so in order to shut out overseas competition.

In the same vein, and to engineer appropriate pace to create that first mover advantage (and maximise long term economic impact), we believe that the region in which the chosen site is situated must already have an economic platform on which to build the spaceport capability. Building a spaceport from green field should be ruled out at this very moment; the economic platform on which to build the campus must include the established presence of a subliminal infrastructure that needs to be improved or developed, but not created; by this we mean that there must already be a critical mass of skilled people, supporting transportation networks and, optimally, a coherent regional economic plan.

The same tenet also pertains for the real estate and infrastructure required to host an ever growing campus of academic, industrial (particularly incubator / accelerators, start-ups and SMEs) and tourist related enterprises, whilst not infringing the low population density requirement which is a key component of the spaceport safety management doctrine.

We are cognisant of the significant amount of work already undertaken by the DfT, CAA, UKSA, BIS and others to provide the baseline assumptions for spaceport selection and we consider that the current tranche of eight sites has been selected on logical grounds (and we see no other contenders in our analysis). Each enjoys differing strengths and weaknesses; 'The Answer' is in there somewhere, but we strongly suggest that there are some key issues surrounding regional level economic development that must be surfaced as the dialogue intensifies. Those top level economic themes we have outlined in our paper are some of those themes, but probably not all.

We undertake to continue our work to provide further substance to the debate.

⁸First commented upon in the Plan for Growth (2011), HM Treasury and BIS Green Paper published 20th March 2013. Of note, the paper makes the following comment: ". In the long term, RAF Lossiemouth has the location, facilities and infrastructure for space tourism flights and the potential to become the European centre for space tourism." Para 2.306, page 220. The matter has now moved beyond space tourism alone.

ANNEX - CAA CONSULTATION QUESTIONS

CAA's High Level Recommendation

Q1. Do you agree with the CAA's high level recommendation that, if a decision were taken to proceed, sub-orbital operations should preferably commence, either on a temporary or permanent basis, from one (or more) of the following:

An existing EASA-certified aerodrome;
An existing UK CAA-licensed aerodrome;
and / or
An existing UK military aerodrome, subject to approval from the MOD

Yes, but we would advise against the concept of 'temporary' or 'interim'. Our strongest possible advice is to provide confidence to the investment markets through development of a single site which should be selected soon, and on a permanent basis.

Q2. Do you agree that in order to make maximum use of existing infrastructure, the location should preferably still be active but at a low level of aircraft movements and should have existing and appropriate ground infrastructure / facilities and service provision?

We agree that the location should be active and should have ground infrastructure / facilities and service provision (including ready access to established incident response capabilities). This is to provide the fastest pathway possible to providing an operational facility. We do not necessarily agree that the level of aircraft movements needs to be low, but simply that the site has the capacity to handle the forecast combination of space and traditional traffic.

Q3. Do you agree that greenfield sites should not be considered?

Greenfield sites should not be considered, as this would have severe implications on programme tempo; this will have deleterious effects on achieving maximum possible market share of spaceport related goods and services, and will marginalise the potential economic benefits.

CAA's Criteria

Q4. Do you agree with CAA's analysis identifying the criteria to be considered in identifying a permanent location for a UK spaceport? If not, please explain why?

We are content with the 'operating' criteria. More data is required on the predicted performance of space vehicles to help make any further judgements.

Q5. Do you think that there are any other criteria that should be taken into consideration? If so, please explain why.

As we have set out above, we suggest a pressing need to develop a set of coherent criteria regarding economic development at national, regional and local levels. These criteria should analyse the economic platform upon which a spaceport related eco-system can be superimposed, that will induce tempo to the delivery of economic benefit catalysed by the spaceport initiative. The criteria should also assess the regional balance of core industries, being alert to potential diversification needs. At the peril of sounding parochial, we suggest that delivery of an integrated infrastructure that provides both horizontal and vertical launch capability should be investigated, and that this could be considered from several of our site options. The production of propellants (with allied carbon footprint) requires investigation.

Q6. Do you agree that these are relevant criteria? What weight should be attached to them?

Yes we agree the criteria detailed in the Consultation document are relevant; they represent the ability to identify a suitable airport/airfield that has the immediate potential to address the short term aspirations of operating spaceplanes by 2018 whilst affording longer term – but yet to be fully defined – development of the UK space industry and global space access. In essence, the criteria represent a 'minima' and should carry equal rating. Of note, and following our own analysis, we believe that criteria pertaining to weather counter-balance over the 8 selected sites and therefore we do not consider it to be a major discriminating factor.

Q7. If more than one location closely meets the essential operating criteria, safety, meteorological, environmental and economic criteria, do you agree that we should also consider factors around the contribution to local and national growth? If so, what weight should be given to these factors?

Yes, it is our considered opinion, and consistent with the determined criteria identifying a 'minima' for the operating of spaceplanes, that in-depth consideration needs to be given to broader influences and drivers such as the economic factors. It is essential that any future selection has a demonstrable ability to grow, both physically and economically supported by a well-established infrastructure and a sympathetic Policy and Regulatory environment. In addition, and to gain maximum future advantage, there must be a compliance and harmonisation with other spaceport operators to ensure that the UK selection can become established on the global space stage both supporting and being supported by other spaceplane operators. As with the 'operating criteria' considered in the previous question, these other factors have as yet to be fully determined and therefore we felt it would be both premature and counter-productive to weight individual elements at this stage. Suffice to say that we fully endorse the importance of said factors.

A Coastal Location?

Q8. Do you agree with the CAA's analysis and strong recommendation that until there is a better understanding of sub-orbital spaceplane safety and performance, spaceplane operations should only take place in areas of low population density and resulting view that a coastal location is suitable to protect the uninvolved general public?

Yes, and unequivocally. It is essential that spaceplane operations and their development have the optimal level of freedom by which their operating envelope is not unnecessarily constrained yet appropriate levels of risks are managed accordingly. Until the spaceplanes achieve a level of maturity and where the commensurate risk of operating has reduced to As Low As Reasonably Practicable (ALARP), then relatively speaking they will carry with their operations higher levels of risk. As with conventional aircraft development we would expect operating risk to diminish over time and for the platforms/air-space vehicles to achieve a normalised and regulated status that represents a minimum risk to the general public.

CAA's Shortlist of Potentially Feasible Locations

Q9. What are your views on the CAA's shortlist of eight potential sites?

The 8 potentially feasible sites all comply with the 'minima' laid out in the Consultation report. They all have different characteristics and particular strengths ranging from runway length to weather to coastal location. For us the criteria, and noting the current use of the nominated airfields, provide evidence for operating in the near term – addressing spaceplanes operating by 2018 from the UK. We feel that the real prize is to acknowledge the ability to operate spaceplanes by 2018 but with a “think big – think far” focus of 2030 and how to enable the accelerated development of the UK space industry and in support of a spaceport; this determines a comprehensive and holistic understanding of the economic drivers. That would then help better determine why one regional location was perhaps better than another.

Q10. Are there any locations on the CAA's shortlist which you consider should be disregarded? If yes, please give your reasoning.

No.

Q11. Are there any other locations that you consider should be on the CAA's shortlist? If yes, please explain why.

No.

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Iomairt na Gàidhealtachd 's nan Eilean