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Mr. Ketley,

Space Development Ventures, Inc. (SDV) is pleased to provide the following response to the Department for Transport's, *Supporting Commercial Spaceplane Operations in the UK; Consultation on criteria to determine the location of a UK spaceport*.

SDV is a U.S.-based company that is actively engaged in establishing Star Harbor Space Training Academy (SHSTA), a first of its kind, all inclusive, space flight participant training facility for the general public that will include a training gym, human centrifuge, hyper/hypobaric chamber, parabolic aircraft (Boeing 767), large pool for spacewalk training, lecture spaces and crew quarters for individuals wishing to train for a suborbital or orbital spaceflight as well as for individuals seeking the spaceflight training experience only. In addition to SHSTA, SDV has established the Spaceship Earth Grants (SEG) project, a worldwide effort to award individuals the opportunity to experience space, on the available carrier of their choice based, in large part, on how this experience will affect their perspective or their place in the world and how they will use this experience in-turn, to affect positive change the world.

SDV has assembled a team of astronauts, industry leaders from both the government and private space sectors, leaders in the space tourism industry, experts in S.T.E.A.M. (Science Technology Engineering Arts & Math) education and outreach, in addition to other highly recognized thought leaders. Since its inception, SDV has actively evaluated the prospects of operating all, or part, of our program from a UK based location. Our response is therefore based on our regular discussions surrounding this possibility.

In addition to those organizations consulted as part of the Department of Transport's consultation paper, SDV recommends that the following organizations be involved in this effort.

- a) FAA AST
- b) Commercial Spaceflight Federation
- c) Existing Commercial U.S. Spaceports (including those with pending applications)
- d) Virgin Galactic
- e) XCOR
- f) Blue Origin
- g) WorldView
- h) Zero2Infinity (Bloon)
- i) Star Harbor Space Training Academy

Our response to the Consultation Questions in Section three of the Department of Transport's request are as follows:

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 permanent or a temporary basis, from one (or more) of the following:

- an existing EASA-certificated aerodrome;
- an existing UK CAA-licensed aerodrome; and/or
- an existing UK military aerodrome, subject to approval from the MOD.

*SDV agrees with the Department of Transport's recommendations that sub-orbital operations should commence at either an existing EASA-certified aerodrome or an existing UK CAA-licensed aerodrome. However, SDV suggests that sub-orbital operations not commence either on a permanent or temporary basis from a UK military aerodrome. Our reason for this is multifold. First, operations from a military aerodrome will create the perception that this technology is being developed for military purposes and not for exploration, tourism and/or other public engagements. Second, operations from a military aerodrome will add restrictions on individuals that can access the facilities and duration of their access that will limit the tenant's ability to capture adequate market share. Thirdly, operating from a military aerodrome can significantly increase the possibility of a force majeure situation. Finally, the operational makeup and strategic importance of a military aerodrome can change, based on changes in world threats, thereby making the location of a spaceport there in opposition to commercial operational requirements and business viability.*

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?

*While repurposing existing infrastructure and facilities would be ideal from a cost and schedule perspective, it should not be overly weighted as many operators would prefer to build facilities to support their specific operations.*

*The level of aircraft movements should be considered from the perspective of the impact to those movements from sub-orbital operations at the airfield. One situation that would be ideal is for the UK government to build multipurpose facilities that can be leased for both short and long term periods by various operators.*

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

CAA's criteria

*SDV is in agreement that greenfield sites should not be considered as locations for a future spaceport in the UK.*

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.

*Except where identified in other responses, SDV agrees with the methodology used in identifying the criteria for identifying a permanent spaceport.*

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

*At this time, SDV has not identified any other criteria that should be taken into consideration.*

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

*The criteria identified are relevant and should be weighted relatively equitably with any emphasis placed on safety and operations.*

Q7. If more than one location closely meet 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?

*SDV strongly believes that a location's contribution to both local and national growth should be considered as a key deciding factor when determining the suitability of one location over another since the ultimate goal of any spaceport is to be a significant contribution to the local and national economies.*

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

*While it is a practical approach to locate a spaceport supporting suborbital launches and landing away from major populations, the focus should be more on the orientation of the runways instead of the actual location of the spaceport. During launch, as is the case for Virgin Galactic and XCOR, the vehicle is in its most hazardous state since it is fully loaded with fuel and propellants. However, during landing, the vehicle is relatively inert since its propellants have been used. With this in mind, a coastal location close to*

*populated areas can be considered. This approach would be the ideal approach since the proximity of large populations would provide a supply of both locals and tourists for tours, skilled tradespeople to support spaceport operations, access to educational institutions for both research and S.T.E.A.M. education opportunities and housing for spaceport employees and their families.*

*For example, the Mojave Spaceport in California is a thriving spaceport and the location of the X Prize Sub-Orbital Launches that drew tens of thousands of spectators. However, its remote location has proven nearly impossible to sustain a significant number of visitors outside of major events. On the other hand, the Kennedy Space Center is located less than an hour from three major population centers in Florida and has significant visitor traffic in conjunction with major space launches – to this day, over 1.3 Million people annually. The launch pads are approximately 10-15 km away and the Shuttle Landing Facility is even closer. Being able to balance the need for safety with a location that is close to population centers has proven to be the most viable operations plan.*

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

a) Campbeltown Airport

*Campbeltown's location, while it meets the requirements set forth by CAA's analysis, is not an ideal prime location for a spaceport. However, it is an ideal alternate landing site for sub-orbital flights from Glasgow Prestwick Airport. There are limited existing structures on the airfield for use and its location at the end of a peninsula makes it hard to access. The runway does allow for departures from Runway 29 and arrivals on Runway 11 thereby limiting the exposure to the local population. The length of the runway may be too short to support the departure of a fully loaded vehicle. However, the reactivation of the deactivated portions of the runway and the displaced threshold at the end of Runway 29 may make the length of the runway adequate.*

b) Glasgow Prestwick Airport

*The Glasgow Prestwick Airport would be a suitable location for a spaceport. Its close proximity to large populations, while seen by some as a detriment, is ideal to support tours, workforce, spaceport support, and STEM opportunities. Its scheduled lights provide the ability for visitors to fly in, however, they also present a challenge to schedule spaceport operations in a way that does not hinder scheduled arrivals and departures. Aprons C and F can be used for spaceport operations in a location that does not interfere with airport operations. The location of Campbeltown Airport to the east provides a suitable alternate landing site for sub-orbital operations from Glasgow Prestwick Airport.*

c) Kinloss Barracks

*Kinloss Barracks has ample facilities and more than adequate runways but its location north of Glasgow and Edinburgh make this location less than ideal. In*

*addition, the orientation of the runways would require departures and arrivals of sub-orbital vehicles to transit populated areas.*

d) Llanbedr Airfield

*Llanbedr Airfield does present an ideal location for a spaceport because of its close proximity to both London and Liverpool. However, the configuration of the runways can present a challenge. The longest runway 17/35 is oriented in such a way that arrivals and departures will transit over populated areas. The ideal situation for operations from Llanbedr Airfield is departures from Runway 23 and arrivals to Runway 05. However, the length of this runway, 1,319 meters, can prove to be too short for sub-orbital operations and the coastal area to the west of the airfield could prove difficult to lengthen the runway.*

e) Newquay Cornwall Airport

*The Newquay Cornwall Airport would be a suitable location for a spaceport. It's close proximity to large populations, while seen by some as a detriment, is ideal to support tours, workforce, spaceport support, and STEM opportunities. Its scheduled lights provide the ability for visitors to fly in, however, they also present a challenge to schedule spaceport operations in a way that does not hinder scheduled arrivals and departures. Departures from Runway 30 and arrivals to Runway 12 would be ideal. The facilities to the southwest of the airfield would prove ideal for use for a spaceport.*

f) RAF Leuchars

*Of all of the potential airfields listed in the Department of Transport's report, RAF Leuchars is, in our opinion, the most ideal. It has more than adequate runways in both length and orientation that allow for departures and arrivals along sparsely populated corridors. There are ample existing facilities and room to construct more. Finally, its close proximity to Glasgow and Edinburgh make RAF Leuchars an ideal location for a UK Spaceport. However, since RAF Leuchars is an active military installation, special consideration will need to be placed on integrating sub-orbital spaceflight operations with base operations.*

g) RAF Lossiemouth

*With the relocation of RAF units from RAF Leuchars to RAF Lossiemouth, the ability to conduct sub-orbital operations from this airfield would be effected. Additionally, the city of Lossiemouth is located northeast of the airfield off the departure end of Runway 05 which poses a safety concern. Additionally, the location of RAF Lossiemouth on the well to the north of Scotland places it at a significant distance from major population centers which are crucial for the support of a spaceport.*

h) Stornoway Airport

*In the opinion of SDV, Stornoway Airport is the least ideal location for a UK Spaceport of all of the locations identified. If location in the far north of*

*Scotland places well out of the way to be easily accessible by both operators, spaceflight participants and the general public. While it could be seen that this remote location would be ideal from a safety standpoint during early operations, its location would most likely have operators looking at locations elsewhere.*

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

*SDV has not identified any locations on CAA's short list that should be discarded.*

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

*The list of potential locations provided is very thorough and SDV has not identified any additional locations within the UK that should be considered.*

Should you have any follow on questions or would like clarity in regards to any of our responses, please do not hesitate to contact us.

In the meantime, please know we are champions and strongly support the UK in its commercial space industry endeavors!

Sincerely,

A handwritten signature in black ink that reads "M. Hoffman". The signature is fluid and cursive, with the first letter 'M' being large and prominent.

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