QINETIQ

SPACE PORT 1

ACP-2021-12

SPACEPORT 1 AIRSPACE DESIGNS & DESIGN PRINCIPLES EVALUATION

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Executive Summary

This report is compiled in accordance with Civil Aviation Publication (CAP) 1616 and details the five airspace design options for the Spaceport-1 (SP-1) vertical rocket launch site at Scolpaig North Uist. It provides details of stakeholder engagement, feedback and evaluation of the design options against each design principle.

This ACP initially captured the airspace requirements for both sub-orbital sounding rockets and orbital small satellite rocket launches from the SP-1 site. It was recognised that sub-orbital launches would come first but, in the interests of efficiency and future proofing the launch site for orbital launch, it was decided to proceed with a single Airspace Change Proposal (ACP) for both. However, due to restrictions imposed on the planning application for the site, it was decided to remove the orbital option and proceed with an ACP for sub-orbital sounding rockets only. It was evident that despite references to orbital operations, both the original statement of need and Design Principles (DPs) (with the exception of one, DP9 splash down areas) were still relevant for sub-orbital launches. The Civil Aviation Authority (CAA) were therefore content for ACP-2021-12 Stage 2 to continue providing it was made clear to stakeholders that the ACP was now only concerned with sub-orbital launch and an explanation was offered regarding the change.

In designing airspace for new sounding rocket systems with limited pedigree, the main challenge is that there remain many unknowns regarding the performance characteristics and safety requirements for these vehicles. Unlike 'conventional' airspace changes where the aircraft performances are well documented such that the airspace can be designed efficiently to meet any number of requirements including environmental and economic, this is not possible for newly emerging systems. To address this, the options are limited to one-off temporary airspace volumes for each launch, or a modular airspace design consisting of several airspace blocks that can be activated as required once the safety analysis for a particular sounding rocket has been completed. For the latter, the options presented are utilisation of the existing Ministry of Defence (MOD) Hebrides Range D701 complex, or designing a similar but new bespoke system originating from the SP-1 launch site.

Despite the reduction in airspace requirements, the Sponsor elected to reach out to a wide stakeholder group to ensure all those who had previously been engaged were kept informed of the change and had the option to provide feedback. The engagement period commenced on 11 October 2022 with a comprehensive letter detailing the statement of need, design principles and airspace design options along with other important background information and considerations. Stakeholders were given four weeks within which to respond. The Sponsor, recognising that the Hebrides Danger Areas EG D701 were a critical element of the airspace options, elected to meet with the MOD at the start of the engagement process to gain an early understanding of any concerns or issues. The other main stakeholder most affected by this ACP is the National Air Traffic Service (NATS) and a face to face meeting was held with them early in the engagement process. All other engagement was via email.

The main stakeholders (MOD, NATS, Highlands and Islands Airports Limited (HIAL) and local airspace users) have been engaged on several occasions not only through this ACP but also ACP-2021-37 – the Temporary Danger Area (TDA) proposal for SP-1. The TDA proposal was focused purely on sub-orbital sounding rocket launch so it was evident much of the work and evidence gained from its stakeholder engagement could be used in the present proposal, once the present ACP had been de-scoped. Lessons identified and stakeholder concerns obtained through the TDA process are therefore referenced in this document.

A total of 88 stakeholders/organisations were contacted and nine responses were received; three of the nine respondents provided feedback: MOD, NATS and HIAL. The remaining six offered no comment on the airspace design options although, one respondent asked for more information on the ACP process and how this aligned to the launch site planning process; and, another respondent asked for more information regarding the ground safety footprint.

Based on the limited feedback received and meetings held with MOD and NATS, each airspace option was evaluated against the DPs using an evaluation process detailed in this report. It is evident from the evaluation process that only three of the six options should be taken forward to Step 2B, the options appraisal. One option, the 'do nothing', is not considered viable for rocket launch. The rationale supporting rejection of two of the other options is primarily based on the fact they fail to meet the majority of the DPs, as both contain a temporary airspace solution that has to be designed for each individual launch on an ad hoc basis. Such temporary airspace restrictions cannot be fully integrated into the Airspace Management (ASM) or flight planning systems used by airspace managers. Furthermore, they are far more labour intensive, provide greater scope for error and require specific ASM procedures to be established for each different airspace design.

The three options taken forward consist of a modular airspace design split into a number of different areas that can be activated as necessary to meet the safety trace of the rocket being launched. Two of the modular airspace options utilise the existing EG D701 MOD Hebrides Range Danger Areas, which enables a variety of sounding rockets to be launched into a safe environment of pre-defined dimensions with existing proven airspace management, surveillance and clear range procedures in place. The other option offers a design that is similar to EG D701 but bespoke, originating from the SP-1 launch site as opposed to the MOD Hebrides Range Head. All options require a new small fillet of segregated airspace around the launch site and a small additional circular area around the launch pad; these airspace volumes are the same dimensions for all three options.

The main concerns raised include but are not limited to:

- The need for effective communication between launch director and local airport;
- That launches are deconflicted from scheduled and emergency Category A flights to/from local airport;
- The potential cumulative effect of SP-1 activities and other nearby restricted airspace activities affecting Commercial Air Traffic (CAT) and the use of a Danger Area for commercial purposes conflicting with other commercial interests.

The three options to be taken forwarded into Step 2B are options 3, 4 & 5 (the latter when associated with option 3). Following stakeholder feedback option 4 & 5 have been refined.

1. Introduction

1.1 Background

The report is compiled as part of the Airspace Change Proposal (ACP) process prescribed in Civil Aviation Publication (CAP) 1616 [A] for a permanent airspace change. ACP-2021-12 has been commenced in order to establish segregated airspace to facilitate sub-orbital[1] rocket launch from the Spaceport 1 (SP-1) launch site on the Outer Hebrides *Figure 1*. QinetiQ is the Sponsor for the airspace change process.

The SP-1 consortium led by the local council, Comhairle nan Eilean Siar, and comprising Highlands & Islands Enterprises (HIE), private investors and QinetiQ, are developing, subject to planning consent, a vertical launch spaceport located at Scolpaig, North Uist. This site is being developed as an opportunity in support of the UK government's spaceflight programme, 'LaunchUK', which aspires to grow the UK's global market share of the space sector to 10% by 2030 and be at the forefront of small satellite launch capability.

The main business demand for the SP-1 facility is for the operation of sub-orbital sounding rockets. It was envisaged that orbital launches would be facilitated sometime in the future and in the interests of economies and future proofing the launch site, this ACP originally covered both sub-orbital and orbital airspace requirements despite the requirements being significantly different. The planning application for the SP-1 launch site is however limited to sub-orbital launch only and to avoid confusion and possible misinterpretation of intent, it was decided that the ACP should focus solely on sub-orbital rocket launch. It is recognised that should orbital launches become an option in the future then this will be the subject of a new planning application and ACP.

The limited capabilities of sub-orbital sounding rockets means the airspace requirements are likely to be less demanding than for orbital launches. Furthermore, unlike orbital launches, launch schedules are not always time critical and launch orientation is not fixed to a specific trajectory. This means the airspace requirements for orbital and sub-orbital differ and utilisation of existing airspace structures, with the addition of a small fillet of airspace around the launch site, could be sufficient to facilitate sub-orbital operations. Despite these differences, there is an airspace requirement common to both: the airspace needs to be segregated to prevent rocket operations[2] causing any increase in risk to other airspace users.

This report provides a number of airspace options that address the Statement of Need (SoN) and align with the Design Principles (DPs) previously prescribed in this ACP. Each option is tested against the DPs and stakeholders were invited to contribute to this process in order to provide a balanced view.

The nature of sounding rockets, with limited pedigree and testing, means there is very limited evidential data available to conduct meaningful safety analysis so a more generic exemplar approach is made to determine the airspace requirements for rocket launches. This exemplar approach is underpinned by

[1] The requirement for orbital launch was removed from this ACP in October 2022.

[2] Rocket operations can be considered as: the time immediately before launch when the rocket is fuelled, armed and ready for launch; actual launch sequence; flight immediately after launch (first few seconds); flight along trajectory line; and splashdown. It should be noted that there may be activity to recover rockets after splashdown but this should not normally require airspace restrictions to be in place.

experience and safety assessment criteria used by QinetiQ for the rocket launches conducted during the At Sea Demonstration/Formidable Shield (ASD/FS) large scale military exercises that occur bi-annually at the MOD Hebrides Range. Using this data, combined with what is known of the various rocket types, a worst-case scenario is developed and the airspace volume designed around this to ensure aircraft operating at or outside the airspace boundary are not exposed to any additional credible risk. The airspace dimensions might be greater than actually required for all rocket launches so to address this, a modular design is promoted that enables different segments of airspace to be activated to meet the specific platform requirements. Such a design involves use of the existing airspace structure of D701, or creation of a wholly new bespoke set of areas; both options are presented here along with the option to modify the D701 areas to enable more efficient use of the airspace.

When deliberating the airspace design options, stakeholders were reminded of the limited use of the airspace relating to SP-1 activity with the launch site being limited to a maximum of 10 launches per year (plus any contingency periods). This is considered an important factor when balancing the pros and cons of each option and will be a notable element of Stage 2B of the ACP process.

All options have been tested with relevant stakeholders and where appropriate, refined. The options are further evaluated against the DPs as prescribed in Stage 1 of the ACP process and each one has then been appraised against the DP evaluation methodology. The options are listed in order of preference based on DP evaluation and stakeholder engagement.

At this stage of the process, it is not possible to monetise costs and benefits due to the nature of rocket launch where there are no benefits to other airspace users, only costs. Furthermore, the value of rocket launch is extremely difficult to quantify given the infancy of the capability and business. It is recognised however, that there will be a financial and environmental cost associated with SP-1 operations where CAT is required to re-route around the activity thereby increasing fuel burn and CO_2 emissions. It is not considered proportionate to provide a quantified assessment of what this impact will be for each of the options at this stage of the ACP process (this will be captured in lager stages); suffice to state that any one of the three options will increase environmental impact and cost.

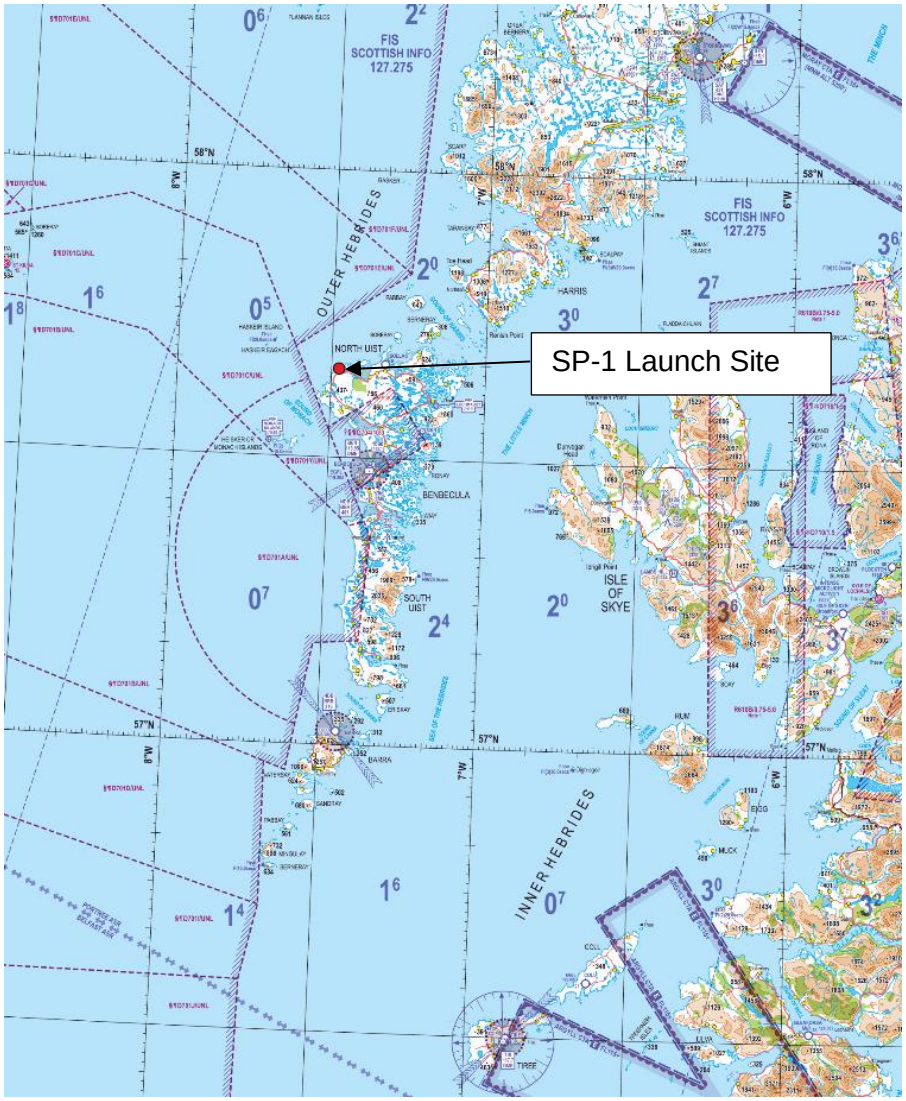


Figure 1: SP-1 Launch site location

1.2 Purpose

The purpose of this report is to demonstrate that the Sponsor has followed due process as defined in CAP 1616 [A] for Stage 2 Step 2A of the ACP process as far as it is practicably possible for a permanent airspace change to facilitate vertical rocket launch. The report evidences that the appropriate level of stakeholder engagement, safety analysis and appraisal criteria (where applicable) has been undertaken.

1.3 Report Structure

The report is split into the following sections

- Section 1
  - Background

2. Statement of Need & Design Principles

2.1 Statement of Need (SoN)

Since the SoN was written orbital rocket launch airspace requirements have been removed from this ACP.

> *"A consortium led by the local council (Comhairle nan Eilean Siar), comprising Highlands & Islands Enterprise, private investors and QinetiQ, are developing a vertical launch spaceport site, herein known as 'Spaceport 1', at Scolpaig, North Uist on the Western Isles. This site is being developed as an opportunity in support of the UK government's spaceflight programme, 'LaunchUK', which aspires to grow the UK's global market share of the space sector to 10% by 2030 and be at the forefront of small satellite launch.*
>
> *Spaceport 1 has been the recipient of local government investment to construct a vertical launch spaceport that will enable small satellite launch. Development of the site and future use by operators will generate much needed revenue for local communities. It is envisaged that significant economic return will result from the creation of high quality job opportunities for local residents, direct and indirect financial income and an increase in personnel residing and visiting the area.*
>
> *The location has been carefully selected in order to minimise disruption to the public and airspace users, the latter through the exploitation of the existing Ministry of Defence (MOD) managed Danger Areas known as the Hebrides Range; the EG D701 complex. Using irreducible spare capacity of the existing Danger Area complex will enable safe testing of suborbital 'sounding rockets' and future small satellite launch rockets[3]. The existing Danger Areas are fully integrated into systems and processes employed by the UK Airspace Management Cell (AMC) and the Eurocontrol Network Manager enabling harmonised and dynamic planning of the Air Traffic Management (ATM) network. Moreover, it is envisaged that QinetiQ will manage any 'new' airspace created under the ACP in exactly the same fashion the Hebrides Range airspace is managed, thereby utilising existing airspace management processes and procedures enabling efficient use of airspace under the Flexible Use of Airspace (FUA) concept. Furthermore, this will facilitate expedient transfer of airspace use from MOD activity to Spaceport operations as well as accommodating short notice changes and, where appropriate, coincident operations.*
>
> *The Spaceport 1 site at Scolpaig currently lies beneath Class G unregulated airspace but is only a few miles from the EG D701 complex. As rocket launch will pose a risk to other airspace users, there is a requirement to safely segregate such activity to minimise risk. Segregation is normally achieved through the promulgation of temporary reserved airspace activated by a Notice to Airmen[4] (NOTAM). However as the airspace is likely to be needed on a regular basis, the promulgation of a NOTAM detailing the coordinates and control procedures for every launch is probably not appropriate as a long term solution. Furthermore, such temporary airspace is*

[3] The requirement for orbital launch options is no longer included in this ACP

[4] Since the SoN was produced the CAA have changed the terminology to be gender neutral and should now read: 'Notice to Aviation'

not fully integrated into the airspace management systems and has to be created on a case by case basis thereby increasing workload and by necessity, the notification periods for activation.

It is therefore considered an ACP is required to provide a small fillet of segregated airspace that provides both adequate protection for the spaceport activities and connects the spaceport with the Hebrides Range Danger Areas. It should be noted that the MOD have developed an agreed process for non-MOD activities to be conducted in MOD sponsored Danger Areas such as the Hebrides Range. This formalised process is an enabler that should allow Spaceport 1 to operate, under certain conditions, in the Hebrides Danger Areas. The small fillet of airspace required under the ACP effectively joins the most easterly boundary point of D701E with D701Y, where the latter adjoins D704.

The ACP will enable both sounding rockets to be tested (nominally on a westerly bearing) and small satellite rocket launch to the North[5]; both trajectories maximising the use of the D701 complex."

2.2 Design Principles (DPs)

In accordance with CAP 1616 the airspace options should be aligned with the DPs. For ACP-2021-12 the DPs were first circulated for comment in June 2021 and were later revised following engagement feedback and the CAA Define Gateway Assessment in September that year. Stakeholders were requested to consider the DPs against the proposed airspace designs and highlight on the feedback form their view. This feedback was collated and is summarised in paragraph 6.1.

It should be noted that the expanded explanation of DP2 and DP3 make reference to orbital rockets, which have since been removed from this ACP. While the CAP 1616 process does not allow for subsequent modification of the DPs' descriptions, the orbital rocket element should be discounted. Furthermore, DP9 is no longer relevant as this relates solely to orbital rocket launch and is therefore Not Applicable (NA).

DP1	**Safety**	**The safety of all airspace users is the paramount factor in the airspace design**
Safety is the single most important factor and DP1 establishes the need to design airspace that provides adequate protection from any hazards associated with rocket launch from SP-1 to other airspace users. Note: safety of third parties on the ground or seaspace is detailed in separate but parallel work packages associated with the planning consent regulations.		
DP2	**Safety**	**The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users**
In ensuring safety of other airspace users the airspace design should consider the potential failure of the spacecraft both at the launch site, immediately after launch and when in flight. The airspace design must be of sufficient volume to contain all credible risks associated with rocket malfunction for both orbital and sub-orbital sounding rockets. The former have trajectories predominantly to the North of the launch site and despite EG D701 complex containing a significant portion of the hazard, the airspace design may need to consider airspace outside the EG D701 boundaries. This		

[5] Although the requirement for orbital 'launch to the North' has been removed, there remains a requirement to be able to conduct certain sub-orbital launches to the North where they can be wholly contained within D701

may, in the interests of minimising the volume of airspace required, call for a bespoke modular airspace design within EG D701 complex as well as beyond.		
DP3	**Operational**	**Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations**
When considering the impact on other airspace users the new airspace should not be considered in isolation but must also take into account the consequential impact of activating numerous EG D701 areas for SP-1 operations (if this is deemed appropriate) at times when the Danger Areas may not normally be activated. This design principle includes consideration of which EG D701 areas need to be activated and their impact on other stakeholders in particular where these necessitate the closure of Oceanic Entry Points (OEPs) for the North Atlantic (NAT) tracks. It may prove beneficial to utilise D701 for sub-orbital sounding rocket activities where these can be contained wholly within the D701 complex. This DP may not be relevant if a bespoke modular design is preferred for orbital launches.		
DP4	**Operational**	**Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant ASM procedures operated within the EG D701 complex**
This design principles should include integration of the new airspace into the ASM processes of the existing EG D701 complex thereby minimising the need for new multifaceted standalone procedures and exploiting current Standard Operating Procedures (SOPs). This will enable timely notification of operations and swift cancellation of NOTAMs thereby freeing up airspace efficiently. Furthermore, expanding extant EG D701 procedures to include the new SP-1 airspace (both around the launch site, beyond D701 boundary or, for a bespoke solution), will enable safe access for other airspace users when deemed necessary, in particular emergency services.		
DP5	**Operational**	**Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design**
It is recognised that use of the EG D701 areas will be subject to MOD activities and priorities therefore an important design principle will be the operational integration of SP-1 activities in and around MOD use. By managing both programmes, QinetiQ expects to be able to facilitate the most efficient use of airspace especially where it is proven safe to conduct simultaneous operations.		
DP6	**Operational**	**The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy**
It is recognised that any new Danger Area airspace will have to comply with the CAA Buffer policy and Air navigation Service Providers (ANSPs) may be required to apply FBZs. The design principles will have to take into consideration both these requirements. Furthermore, the advent of FRA in the Scottish Flight Information Region (FIR) will need to be considered.		
DP7	**Environmental**	**The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area**
It is likely that the new airspace around the launch site and beyond the boundaries of EG D701 will be relatively small in volume (due to rocket launch profiles), and therefore current traffic patterns should be unaffected. However, a holistic approach is required to consider the wider impact that subsequent activation of the EG D701 Danger Areas, (and any additional airspace requirements beyond EG D701, including a bespoke modular design) will have, in particular on the (North Atlantic) NAT tracks. Any deviation caused by unavailability of OEPs will have to be carefully considered in the airspace design to understand the environmental impact of additional miles flown by aircraft forced to deviate from route. It is further acknowledged that rocket launch from the site		

at Scolpaig will create noise and light pollution; and these elements will need to be considered in the airspace design especially where they are traded off against minimising disruption to CAT. Many of these environmental issues are being considered within the planning application and associated Environmental Impact Assessment (EIA); the latter will help inform part of the ACP process.		
DP8	**Regulatory**	**The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018**
It is recognised that the airspace design might be influenced by the secondary legislation to the Space Industry Act (SIA) 2018. The design principles will take account for any additional legislative requirements, in particular where these are linked to the Spaceport operator licence and Range operator licence.		
DP9	**Operational**	**Rocket stage drop zones may be required outside the EG D701 Areas and will need to be considered**
For orbital rocket launch, it is expected that one or more rocket stages may be required that will separate after launch. Where separation and return to earth occurs outside the EG D701 complex, additional segregated airspace will be required – The design principle should include the most efficient use of airspace to accommodate this requirement.		

3. Stakeholder Engagement

3.1 Stakeholder Identification

Due to the position of the SP-1 site and the location of the airspace being created under the ACP (predominantly over the ocean), it was considered that a reduced targeted key stakeholder engagement would be necessary. In the interests of transparency, the Sponsor did contact all National Air Traffic Management Advisory Committee (NATMAC) members and additional stakeholders identified during the TDA ACP process.

Although the airspace around the launch site is of relatively small volume, the Sponsor identified that the activation of this airspace enabled uninterrupted segregated airspace connectivity to all the D701 Danger Areas and it was the activation of these areas that would cause the greatest impact on other airspace stakeholders. Based on the Sponsor's wide knowledge, experience and understanding of the design, operating procedures and Letters of Agreement (LoA) pertaining to the Hebrides Range, it was fairly straightforward to identify the key stakeholders (utilising information from the Hebrides Range ACP in 2014 and current regular engagement with stakeholders affected by Range activities). It was noted at the CAA assessment meeting that some of these stakeholders operated helicopters from a number of different companies; the CAA forwarded a comprehensive list of these companies to the Sponsor who was able to add them to the engagement list. Furthermore, as a result of CAA feedback during the TDA process, the Sponsor reached out to users of the Sollas beach landing site. It was further decided to engage with the UK Airspace Management Cell (AMC), despite this organisation consisting of MOD and NATS personnel, as their role in airspace management and functional input into the D701 complex activations was seen as a key to help inform the ACP process.

3.2 Engagement Methods

Written Communication - The Sponsor sent out, via email, a comprehensive letter detailing the SoN, DPs, airspace options, background information and other considerations to all stakeholders. A four-

week engagement period was declared (11 Oct 22 – 9 Nov 22) and stakeholders were invited to respond to the Sponsor using the feedback form attached to the letter. This form also asked stakeholders to consider the DPs against each option, with the aim of assisting in the DP evaluation.

The Sponsor continued to respond by email to stakeholder feedback and questions upon receipt.

Online Meetings - The Sponsor decided that an early meeting with the MOD, at the start of the engagement period, was appropriate because of the potential impact the proposed airspace options had on their operations and use of D701. It was deemed critical to understand any major concerns the MOD may have early on in the process. The airport operator for the Outer Hebrides, Highlands and Islands Airports Ltd (HIAL), were also identified as a key stakeholder who had been fully engaged in the ACP-2021-37 TDA process. An online meeting with HIAL was offered but not taken up.

The Sponsor considered inviting all other stakeholders to a WebEx event but the lack of responses suggested that, other than the main players (NATS and MOD), there was little interest in this ACP now that it had be reduced to sub-orbital rocket launches only, and it would be disproportionate to facilitate such a meeting.

Face to face (f-2-f) Meetings - From experience gained during the ACP-2021-37 TDA engagement period, it was recognised that NATS were one of the main protagonists who raised concerns over future rocket launch from the SP-1 site and use of the D701 areas for commercial rocket activities. It was therefore decided to hold a f-2-f meeting with them at an office of their choice. The aim was to understand early on in the process any potential show stoppers from a NATS perspective and identify their main areas of concern.

Evidence of all meetings and correspondence is contained in the Appendix to this report.

3.3 Engagement Chronology

Date	Action/Stakeholders Contacted	Notes
11 Oct 22	Engagement material sent to all NATMAC members by email (43)	Feedback response form attached
11 Oct 22	Engagement material sent to 45 other identified stakeholders by email	Feedback response form attached
11 Oct 22	Virtual Teams Meeting held with MOD	Discussed options
18 Oct 22	F-2-f meeting with NATS	Delivered presentation and discussed options
19 Oct 22	UK/Irish ASM meeting attendees	Delivered PPP and discussed options
11 Oct 22 – 9 Nov 22	Formal engagement period	9 responses received of which 6 had no comment on the airspace options
9 Nov 22 – 18 Nov 22	Responding to stakeholder feedback	Sponsor responded to each stakeholder who provided feedback or posed questions
22 Nov 22	Design options report uploaded to CAA airspace portal	

Table 1: Engagement Chronology

4. Design Options - Considerations

4.1 Important Background Information

QinetiQ, in developing the temporary airspace for SP-1 (ACP-2021-37), gained a significant amount of important information on the concerns of local airspace users, Air Navigation Service Providers (ANSPs) and the MOD. This information has informed the airspace options process and will be used in the options appraisal during Step 2B of Stage 2.

4.1.1 Airspace Change – Vertical Launch Spaceport Differences

Unlike 'normal' airspace changes associated with accommodating aircraft with established safety pedigree and the ability to easily manoeuvre, where it is possible to modify flight profiles (and thus airspace design) to meet stakeholders' needs; the airspace change process is not as straightforward in the case for vertical launch spaceports. Here the options for airspace design are limited as they are driven by the required trajectory of the rocket system (with limited pedigree) and the associated safety trace[6] that determines the boundary of the airspace either side of the trajectory track. This boundary has to be sufficient distance from trajectory track to ensure all credible hazards associated with a malfunction or catastrophic failure of the rocket are contained therein. The safety trace around the trajectory track encompasses the worst case scenario events that could occur on the launch pad, in the minutes after launch and at any time during the rocket flight until it no longer poses a threat/hazard (i.e. once it splashes down in the ocean). The safety trace and debris field (following explosion) generally 'fans out' from the launch site as the vehicle increases velocity and gains altitude, thereby increasing the size of any debris field following failure. Therefore, catastrophic failure on the launch pad or immediately[7] after launch, means the debris field is contained in a relatively small area; it is only once the vehicle is climbing and rapidly accelerating that the hazard area and debris field increases and more airspace is needed. This expansion of hazardous area/debris field continues to fan out until it reaches a point where it will not have any further increase in the lateral plane, only in the direction of travel along the line of trajectory post failure until 'splash down'. For these reasons the airspace design options show a comparatively small safety trace area around the launch site, thereafter fanning out until splash down.

4.1.2 Spaceport Airspace Challenges

A further challenge to the airspace design is the fact each different rocket type will have a different safety trace. Furthermore, not only does the safety trace change between different rocket types but also between the same rockets where the payloads are of different mass. Where the acceleration of the rocket is reduced due to high mass payload, this results in the rocket travelling a greater distance along the trajectory track before splashing down. This information is only fully understood during the planning stage for each individual launch where the safety traces are calculated along with the corresponding airspace requirements. Only when the airspace requirements are known can the

[6] Safety trace is the term given to the volume of airspace needed to contain all credible hazards, including the debris field created by any failure or subsequent destruction of the rocket that may pose a risk to third parties. This includes the failure of any of the vehicles' systems or components, as well as catastrophic system failure planned (in the case of a flight termination system) or unplanned.

[7] Within a few seconds after launch.

airspace design be developed. This means it is extremely difficult to predict at this juncture what the exact airspace dimensions are likely to be for each launch other than in the immediate vicinity of the launch site (paragraph 5.1 refers). To address this, the Sponsor proposes a modular block design extending from the launch site that can accommodate a number of trajectories[8] and worst case scenarios; different blocks of airspace can then be activated to meet the safety trace of the rocket being launched once these are known. Furthermore, this method enables the launch of rockets with limited pedigree to be safely operated.

This challenge is no different to the testing of MOD systems on the MOD Hebrides Range[9]. This is why the D701 Danger Area complex is made up of a number of different airspace blocks (26) that extend out from the Range Head incrementally. When a system is going to be tested on the Range, all the relevant data is examined and the appropriate safety trace designed for that system. The safety trace is then overlaid onto the D701 areas to determine what areas need to be activated in order to wholly contain the hazard. The trajectory or firing line can often be adjusted to minimise the number of D701 areas needed. The Sponsor is proposing exactly the same methodology is used for sub-orbital rocket launch by either utilising the existing D701 complex or creating a new bespoke airspace structure originating at the SP-1 site.

4.1.3 Other Considerations

It was identified during Stage 1 of this ACP, and during the TDA engagement process, that the airspace design options will need to consider the most efficient use of airspace. Where existing airspace structures are contemplated for ease of use, flexibility to operators and utilisation of tried and tested processes and procedures, these considerations need to be carefully balanced against the cost and impact on other stakeholders. This will form an important part of the next step, the 'options appraisal'.

The impact that closing large areas of oceanic airspace has on the ATM network is well documented and understood by the Sponsor. Careful consideration of how to minimise the impact remains a key element in the airspace design and subsequent operating procedures. Furthermore, it is recognised that any such closures should not be measured in isolation and the cumulative effect of segregated activities across the UK FIR will need to be reflected through the development of agreed airspace protocols between all main parties (MOD, Spaceport operators, ANSPs, aviation stakeholders and Regulator).

The Sponsor is cognisant that FBZs will be required around those areas of new segregated airspace that are developed and these FBZs may differ in size depending upon the location of the segregated airspace. Furthermore, it is understood that additional airspace reporting points might need to be established to enable General Air Traffic (GAT) to safely route around the segregated airspace when active. These aspects will be explored further during the next step of the ACP process.

[8] Different trajectories are necessary to meet varying characteristics of different rocket types and may be influenced by environmental and other airspace considerations.

[9] The MOD Hebrides Range consists of EG D701 and EG D704.

5. Airspace Options

5.1 Airspace around Launch Site – Background

As described at paragraph 4.1.2 above, it is extremely difficult to define the exact airspace requirements for sub-orbital rockets due to the infancy and lack of pedigree of the systems involved. The most effective way to address this is to consider a worst-case scenario sub-orbital rocket system by using available data gained from rocket design manufactures and experience gained launching weapon systems and ballistic missile targets from the MOD Hebrides Range (the latter providing the closest data comparable with sub-orbital sounding rockets). By using the same tools, modelling and analysis as that used by the MOD Hebrides Range for these activities, the maximum safety footprint (safety trace) can be effectively evaluated. QinetiQ staff undertook safety analysis work to determine the airspace boundary required to contain all credible hazards associated with such 'worst-case' rocket launch, considering catastrophic failure on the launch pad and immediately after launch within the first few seconds of flight in different environmental conditions. The minimum airspace required to do so has been positioned to provide connectivity to the existing Hebrides Range Danger Area (D701 & D704), from the launch site. Beyond the launch site, using the same safety analysis processes, the necessary volume of airspace can be predicted. This volume of airspace will fit entirely within the existing D701 areas.

During the TDA ACP process (ACP-2021-37), the initial view was to keep the design around the launch site as simple as possible by drawing a straight line between two exiting Aeronautical Data Quality (ADQ) points, connecting D701F and D704 (see *Figure 2*). It was determined that this area, herein referred to as the 'fillet', was more than adequate to contain the hazards. Moreover, by using two existing ADQ points this would simplify the airspace change process and be easier to understand in particular for the TDA that was needed ahead[10] of the permanent airspace solution.

[10] At the time the TDA had a compressed timeline and this 'more than safe' option was considered appropriate given the very limited time available to conduct additional safety analysis.

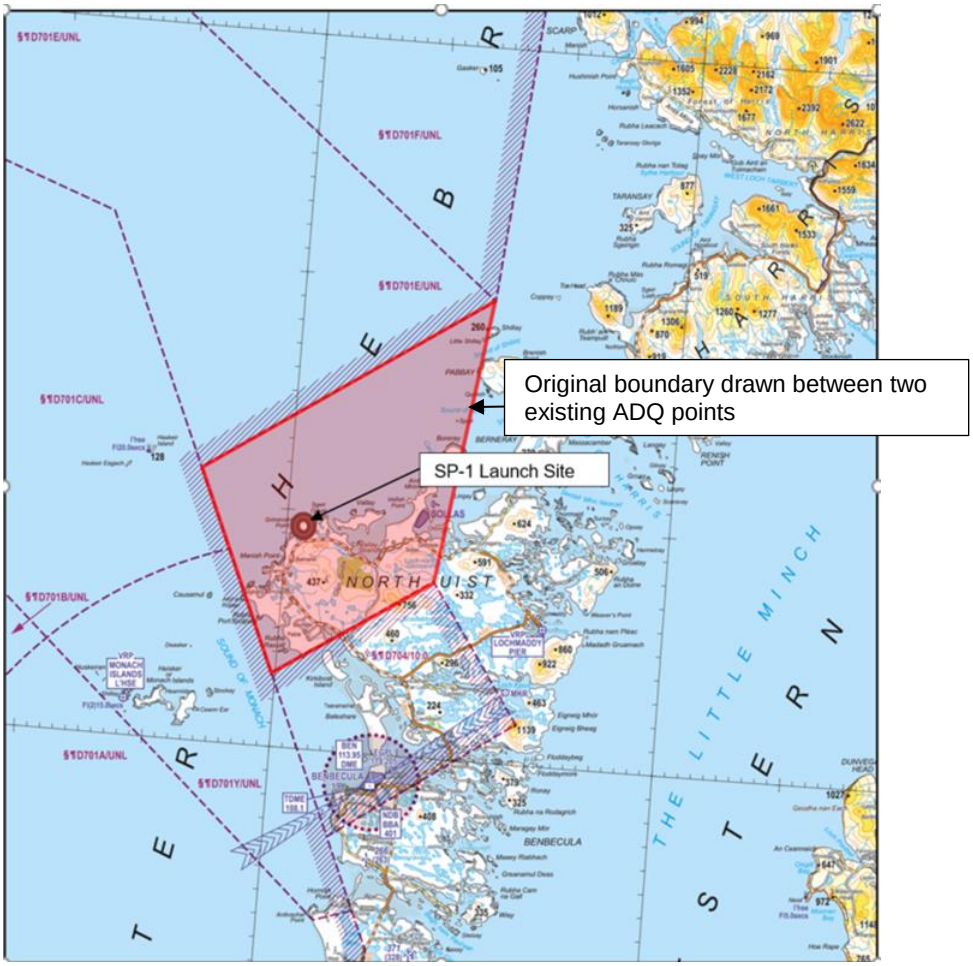


Figure 2: Diagram depicting the original proposed airspace 'fillet' design over SP-1 launch site

However, it was documented during the TDA proposal development that this design had the potential to impact on the beach landing strip at Sollas. Following the concerns of Sollas stakeholders and subsequent delay of the TDA, further in-depth safety analysis was conducted, the results of which demonstrated the eastern boundary of the fillet could be safely re-profiled so as not to affect the landing site at Sollas. The original airspace fillet design is therefore discounted as an option in favour of the new proposed design that is shown at *Figure 3*.

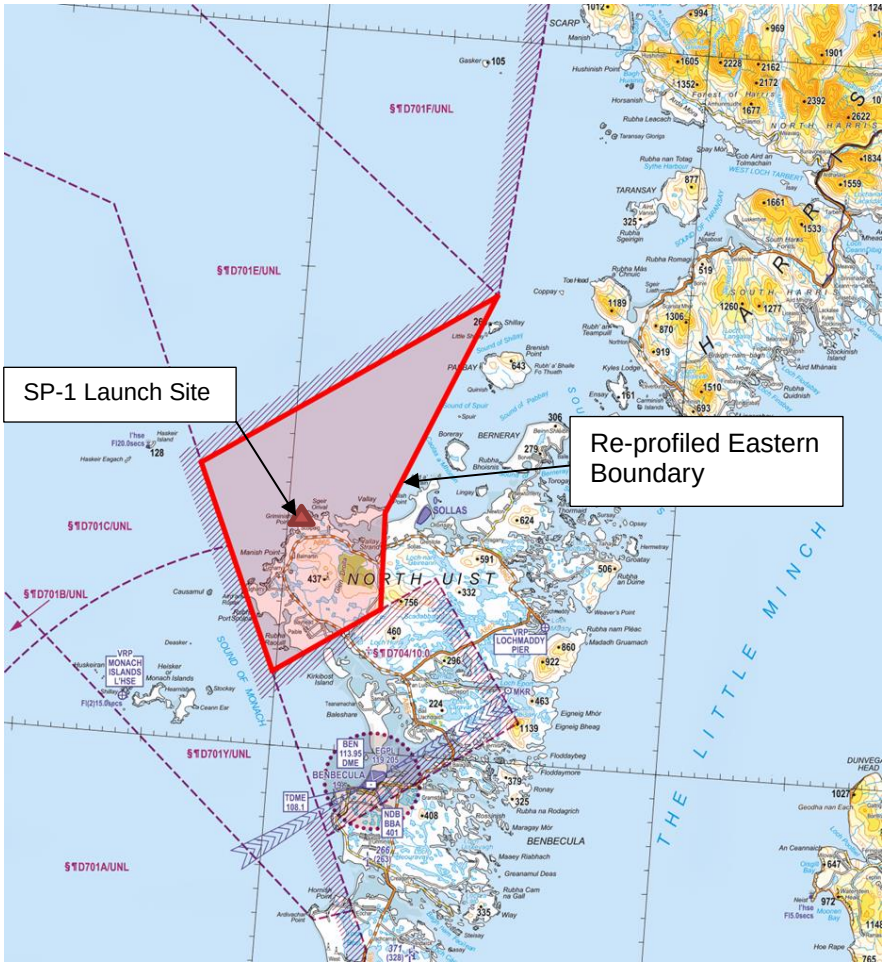


Figure 3: New proposed re-profiled small 'fillet' of segregated airspace around the SP-1 launch site

5.2 Additional Small Segregated Area within the Fillet

It was further identified, from experience gained launching ballistic missile targets from the MOD Hebrides Range during the ASD/FS Exercises that there is likely to be a requirement to safeguard personnel (working at the launch site) from the hazard created by low flying aircraft. It is determined that these spaceport personnel may be at risk of harm while engaged in pre-launch preparation such as refuelling and arming phases of the rockets, if they are suddenly alarmed by the appearance and noise from a low flying aircraft; in particular fast jets. Because these refuelling/arming activities may occur several hours or even days before the intended rocket launch it was determined, in the interests of FUA that it would be inappropriate to have the whole segregated airspace fillet activated for the purpose of protecting ground personnel. It is proposed that a small inner circular area around the launch pad, as depicted in *Figure 4*, is made available. This can be activated for longer periods of time without adversely impacting on other aviation stakeholders. This additional volume of airspace extends 1000m laterally from the launch pad, extending to 3000ft above ground level (AGL) and sits within the larger airspace fillet. The primary use of this small area of segregated airspace is to protect SP-1 personnel on the ground from the sudden appearance and noise from a low flying aircraft. It may further be of use (should it be deemed necessary by the rocket providers) to provide the rocket systems

with Radio Frequency (RF) interference protection from low flying aircraft during the same critical stages of preparation.

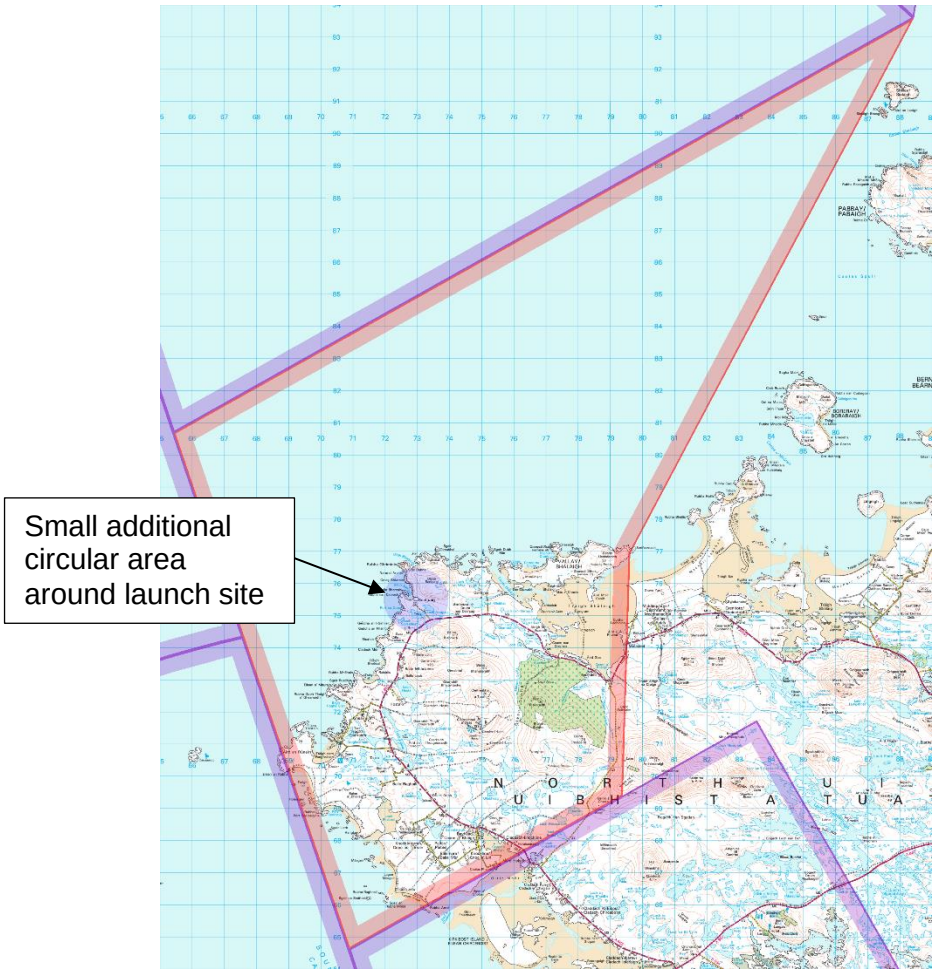


Figure 4: Proposed airspace 'Fillet' with additional circular segregated airspace area around launch site

5.3 Airspace Design Options

The SoN determines that sub-orbital rocket activities, from launch to splashdown, require segregation[11] from other airspace users. Five airspace design options are presented that meet the SoN. The fillet of airspace at *Figure 4* and described in paragraph 5.1, has been evaluated to be the minimum size needed around the launch site for all options presented other than Option 1 and Option 2. In Options 1 and 2, the airspace volume round the launch site would be determined on a case by case basis for each individual launch, but in all cases will not exceed the parameters of the airspace prescribed in paragraph 5.1.

The options presented each have advantages and disadvantages and these will be investigated further in Step 2B during the options appraisal. The options should however be considered in conjunction with

[11] As rockets will be unable to comply with the Rules of The Air (RoTA).

the expected use of the airspace, namely 10 launches per year for fairly short periods of between 1-3 hours. It is acknowledged that the airspace will be needed on more than 10 occasions each year as contingency will have to be built into any launch schedule such that spare days will be required. This will be offset where possible through notification processes and procedures that ensure any cancellation of airspace is conducted in sufficient time to be enable the airspace to be 'flight planned' for the following day. Experience gained from operating the MOD Hebrides Range and extended NOTAM areas in oceanic airspace, has enabled Range and ASM staff to develop many airspace efficient procedures – these will be utilised in any future SP-1 activities.

Option 0 is presented as the do nothing option that provides a baseline for the current modus operandi for the airspace today. Although this option is considered unviable for SP-1 launches, it is against this baseline that the options appraisal will be undertaken so it remains an important element of the process.

5.3.1 Option 0 - Do Nothing Baseline

This option leaves the airspace as it currently exists (depicted in *Figure 5* and *Figure 7* below) with the SP-1 launch site sitting within Class G airspace. Although utilisation of D701 Danger Area could provide segregation for a portion of the rocket trajectory (where this is permitted), the area around the launch site would remain unsegregated. Without segregation, it is considered that rocket launch could not occur due to the risk to other airspace users as rockets will have no means of complying with the Rules of The Air (RoTA) appropriate to the class of airspace. This option is therefore considered unviable.

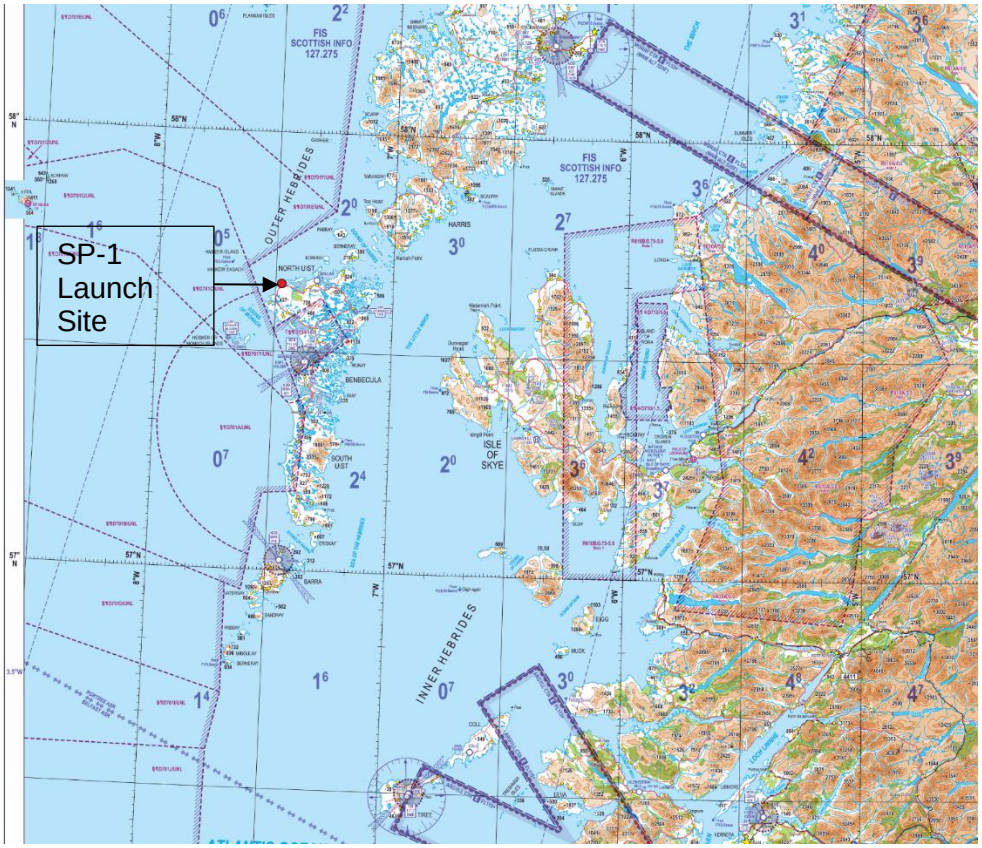


Figure 5: Local area airspace in the vicinity of SP-1 site

The SP-1 launch site at Scolpaig, North Uist has Benbecula Airport approximately 10NM to the south, the small beach landing strip at Sollas approximately 5.5NM to the east and Stornoway Airport approximately 58NM to the north east. The launch site is located between the MoD Hebrides Range Danger Areas EG D701 and EG D704 (see *Figure 5*). There is limited General Aviation (GA) activity in the local area with this mainly concentrated during the Sollas annual fly-in event during the summer. Other aviation activity is minimal, comprising prominently scheduled flights to/from Benbecula (circa 6[12] flights per day during the busier summer months), occasional helicopter activity supporting local hotels, fish farms and coastguard, plus medical and lighthouse support aircraft. Military aviation activity in the local area is primarily focused on trials and testing of systems on the MOD Hebrides Range (D701/D704) and training flights. The latter increase significantly twice a year for two weeks during the Joint Warrior Exercises and again for the biennial ASD/FS and Atlantic Thunder (AT) Exercises (which each occur alternate years). This increase in military activity also escalates the use of Benbecula airport with military support aircraft, although these flights predominantly occur several weeks before and after the main exercise periods.

Benbecula airport operates instrument approaches to two main runways, namely 06 and 24; an extract of the approach charts contained within the AIP are shown at *Figure 6*.

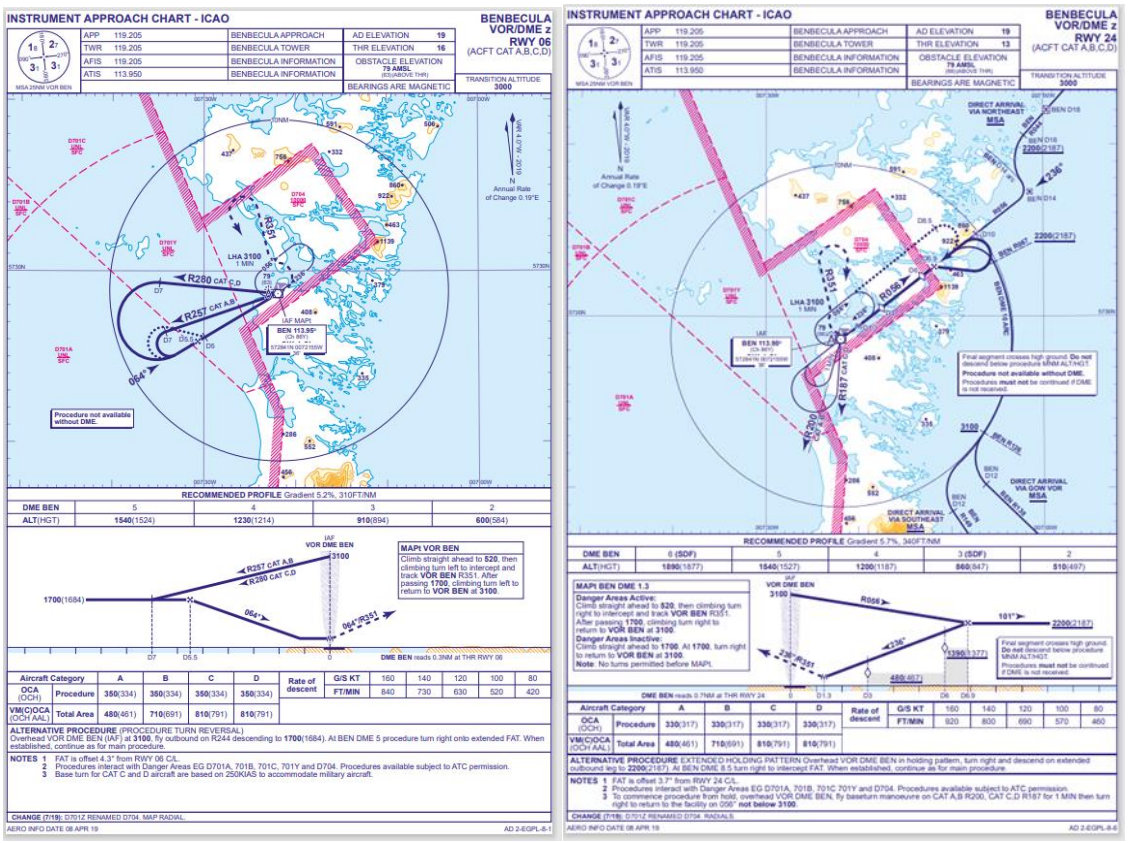


Figure 6: AIP extract depicting main instrument approach charts to Runway 06 and Runway 24 at Benbecula

[12] Details obtained from the single commercial carrier, Logan Air, during the ACP TDA engagement 3 Feb 22.

Information gained during the TDA (ACP-2021-37) engagement process has indicated that rocket launch from the SP-1 site at Scolpaig should not impact on flights operating to/from Benbecula, Barra or Stornoway Airports apart from only one approach to Benbecula being potentially affected, namely visual approach to Runway 06.

The airspace to be utilised under this ACP is largely over the ocean with very few land areas other than in the immediate vicinity of the launch site and a number of small generally uninhabited islands. Several of these islands have lighthouses that are serviced by helicopters operating on behalf of the Northern Lighthouse Board (NLB).

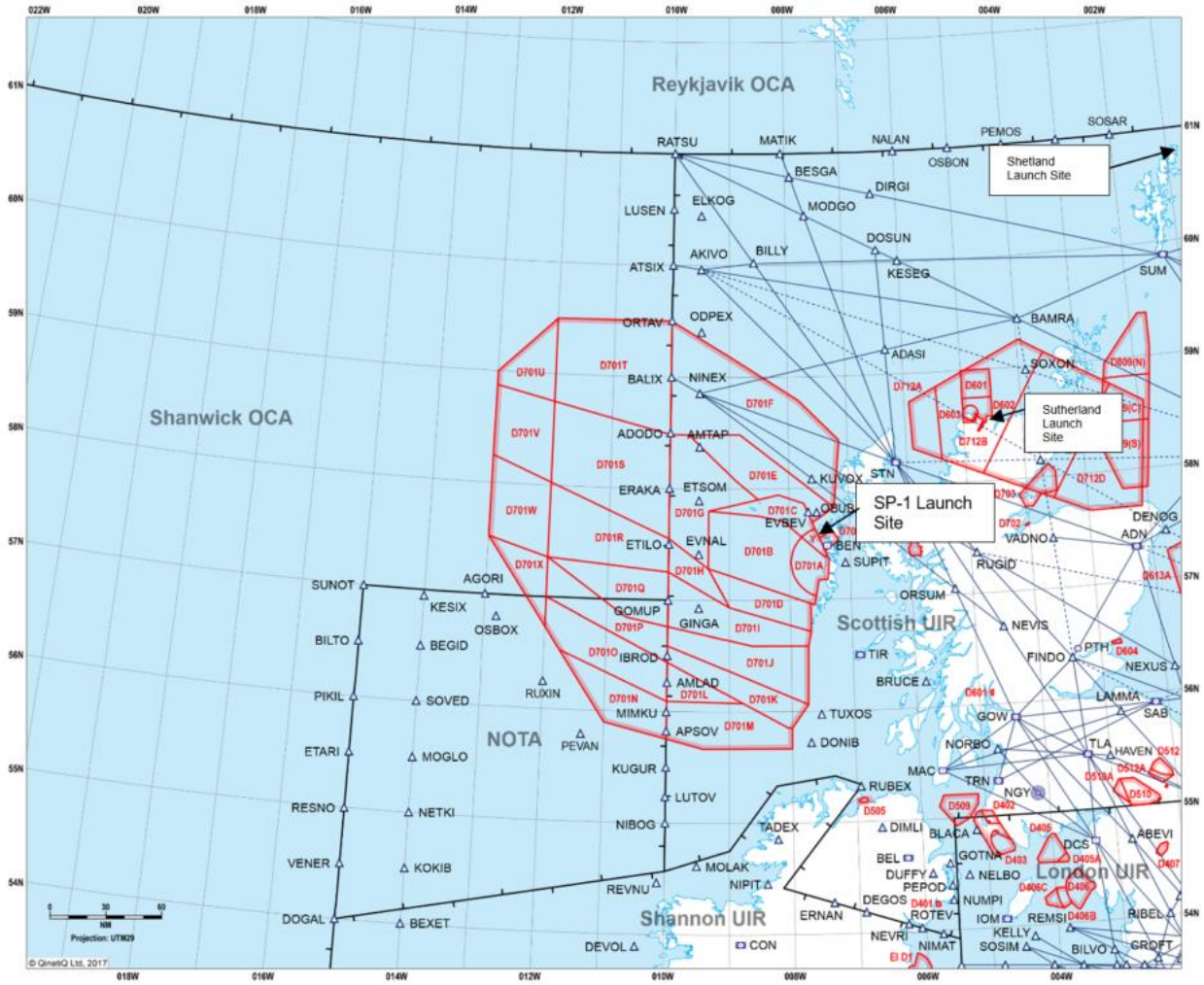


Figure 7: Adjacent airspace in relation to SP-1 launch site including other planned vertical launch spaceports

Considering the airspace further afield, it can be seen that SP-1 activity will mostly affect CAT routing on the NAT oceanic tracks through the OEPs at 10˚ west and, potentially[13], MOD activity. There are also a number of other military sponsored Danger Areas over the North of Scotland that if active at the same time as SP-1 could have a blocking effect on CAT over Scotland. This is potentially further

[13] SP-1 activity and use of D701 or airspace contained therein, will normally be deconflicted from MOD activity where possible – details will be contained in the relevant LoA between SP-1, QinetiQ and MOD.

exacerbated by the development of other vertical launch Spaceport sites at Sutherland and Shetland (see *Figure 7*). These issues will need to be addressed later in the ACP process.

The impact that activating D701 has on CAT and the ATM network is well documented, and the methods used to minimise the impact are contained in the appropriate LoAs and SOPs for the MOD Hebrides Range.

The original design of the D701 Danger Area complex was driven by the need to have a flexible modular airspace structure extending outwards from the Range facility (target and ordnance launch pads) that could be activated area by area to accommodate the vast array of different systems being tested and trialled on the Range. This design further evolved to replicate the main upper air, Air Traffic Service (ATS) routes from the UK and Ireland, where these joined the OEPs at 10° west. This alignment of the area boundaries to the ATS routes accounts for the unusual shape of several of the D701 areas. This alignment enables the most efficient use of the airspace by minimising the number of routes and OEPs that would be unavailable when specific D701 areas are activated. This does have the consequential impact of occasionally having greater volumes of airspace segregated than is necessary to contain the safety traces of the systems being operated but it was considered the benefits of the alignment far outweighed the reduction of usable airspace.

Since the D701 areas were re-designed (2014), the ATS routes have been discontinued and the upper airspace is now Free Route Airspace (FRA). Although this means the criticality of having the boundaries of D701 aligned to air routes has been removed, the need to minimise impact on the OEPs remains, and FRA still requires aircraft to route through the OEPs for their oceanic track such that the routes flown under FRA are similar to the old ATS routes. It is understood that at some stage in the future, FRA will be introduced to the NAT thereby removing the need for OEPs.

The existing D701 areas lie within Shanwick Oceanic Area and the North Atlantic Transit Area (NOTA). Here the ANSPs (NATS and the Irish Aviation Authority (IAA)) apply flight planning separation criteria to the boundary of the respective D701 Areas when active. The separation applied east of 10° west is the standard 5NM radar separation but once west of 10° west, NATS apply non-radar procedural separation of 30NM, or 60NM for Non Minimum Performance Standard (NMPS) aircraft. The IAA apply standard radar separation criteria for the NOTA. It is expected that the procedural separation criteria will be reduced at some stage in the future with the advent of Automatic Dependant Surveillance–Broadcast (ADS-B) capability in the NAT. This is ongoing work within the International Civil Aviation Organisation (ICAO) working groups.

As the D701 Areas are fully integrated into the ASM systems[14] used by the UK AMC and Eurocontrol Network Manager (NM), they can be activated a relatively short notice with the airspace restrictions being automatically applied along with the necessary FBZs that are required for FRA. These can be activated for a number of scenarios dependent upon which D701 areas are activated. This means the available OEPs are known for any number D701 activated areas and any restrictions such as FBZs are quickly applied or, conversely, removed when the areas are deactivated. This enables the harmonised and dynamic planning of the ATM network in line with the FUA principles.

[14] The UK AMC, NATS and MOD Hebrides Range use the EUROCONTROL preferred system called 'Local and sub-regional airspace management support system' (LARA) as an airspace management tool.

5.3.2 Option 1 – Do Minimum

This option would necessitate bespoke airspace designs for each individual launch following the safety assessment and safety trace analysis. NOTAMs and associated Aeronautical Information Publication (AIP) Supplement (SUPP) information would have to be created and published for each launch to enable segregation. Such one-off NOTAMs would not be fully integrated into the UK AMC or Eurocontrol NM ASM systems that enable the harmonised and dynamic planning of the ATM network. An exemplar NOTAM is depicted at *Figure 8* and *Figure 9.*

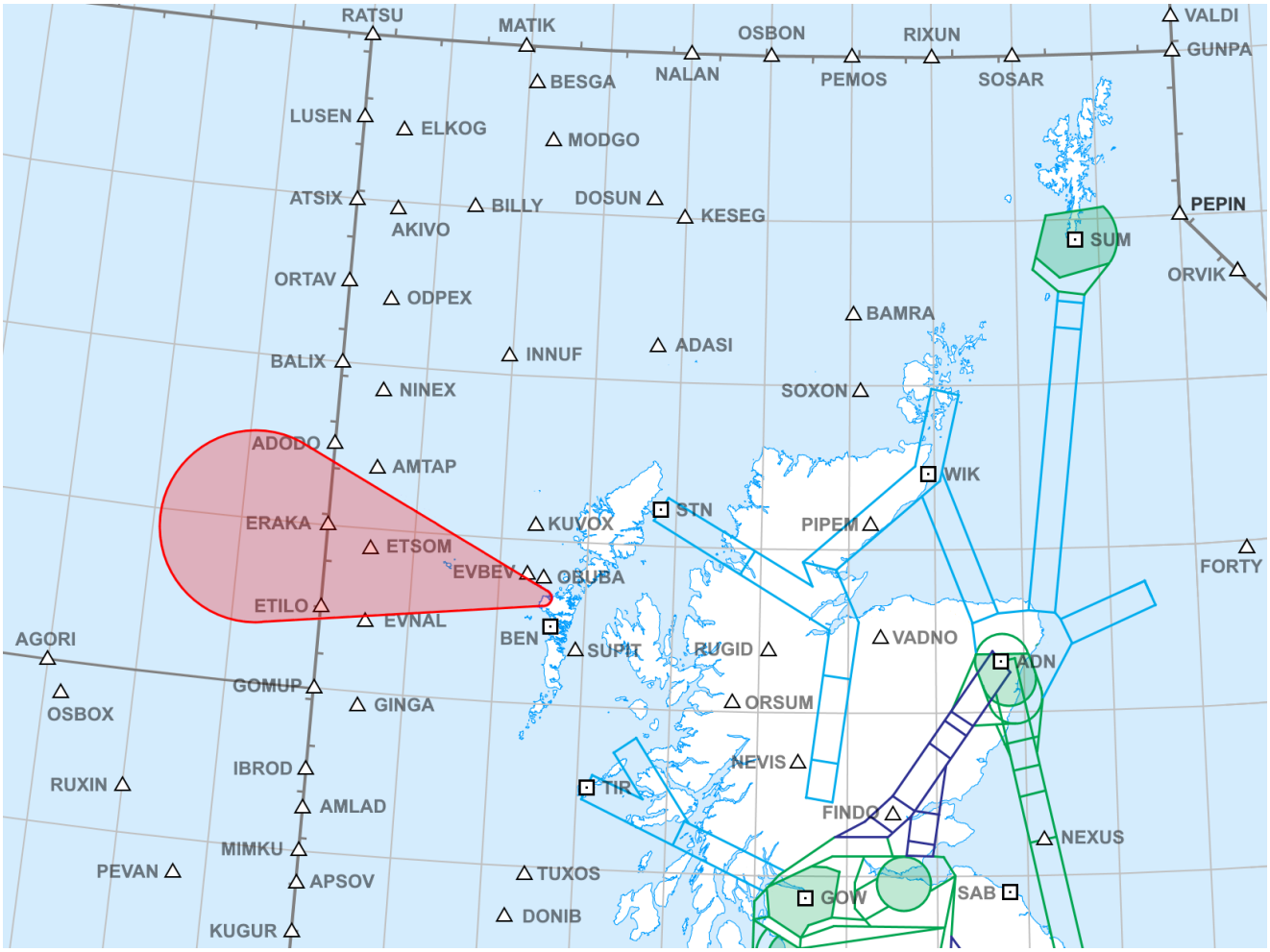


Figure 8: Option 1 - Do Minimum: Diagram showing an exemplar NOTAM area for single rocket launch

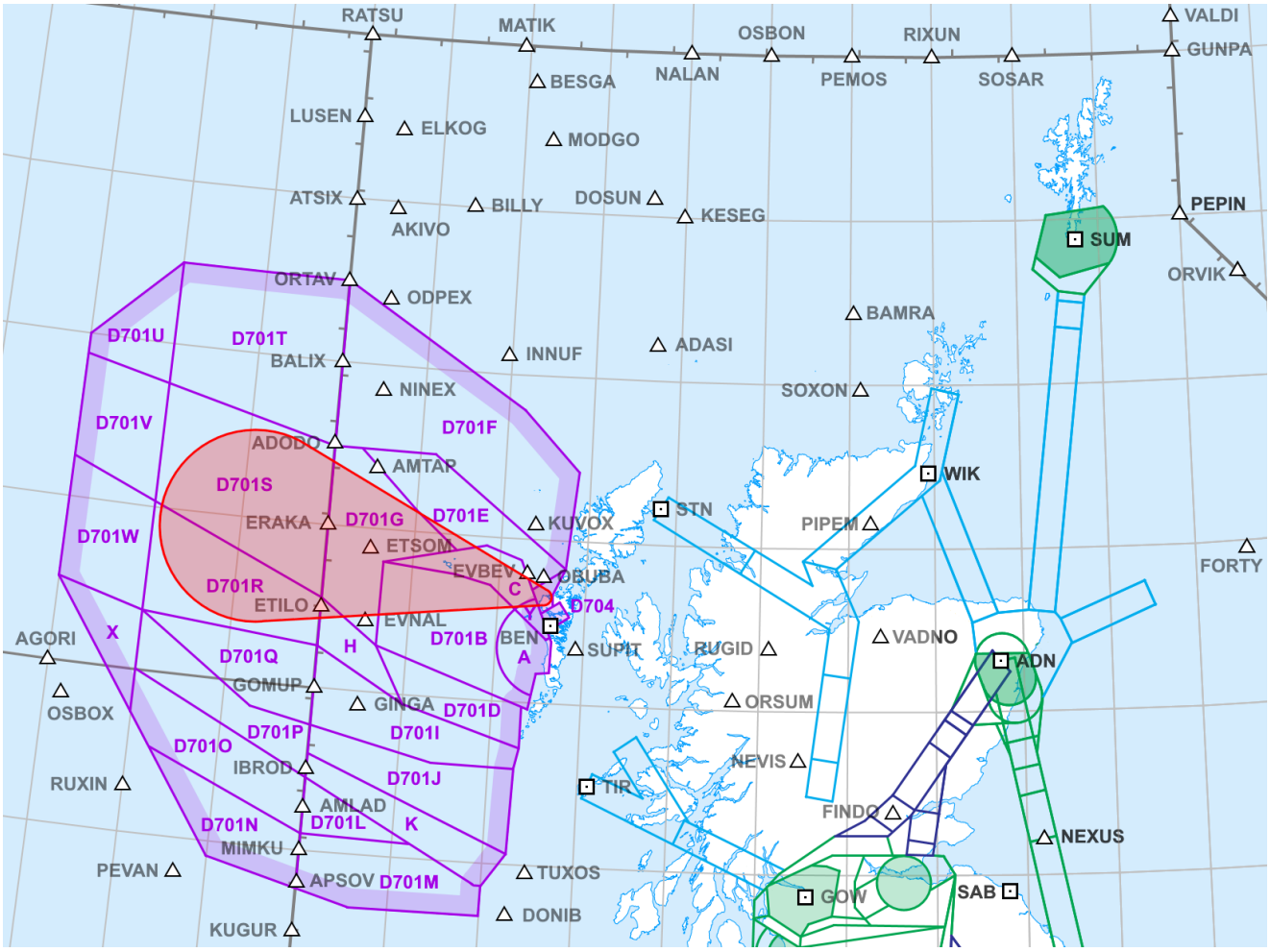


Figure 9: Option 1 - Do Minimum: Diagram showing an exemplar NOTAM area for single rocket launch with D701 overlay

5.3.3 Option 2 – Do Minimum and Utilise D701

This option would still necessitate an individual NOTAM and associated AIP SUPP information for the fillet of airspace around the launch site for each individual launch. Such one-off NOTAMs would not be fully integrated into the UK AMC or Eurocontrol NM ASM systems that enable the harmonised and dynamic planning of the ATM network. The D701 areas could be activated in the normal manner using only those areas necessary to contain the safety trace of the rocket being launched. An example of the areas required for a sub-orbital rocket launch similar to that shown in Option 1 is depicted below in *Figure 10*.

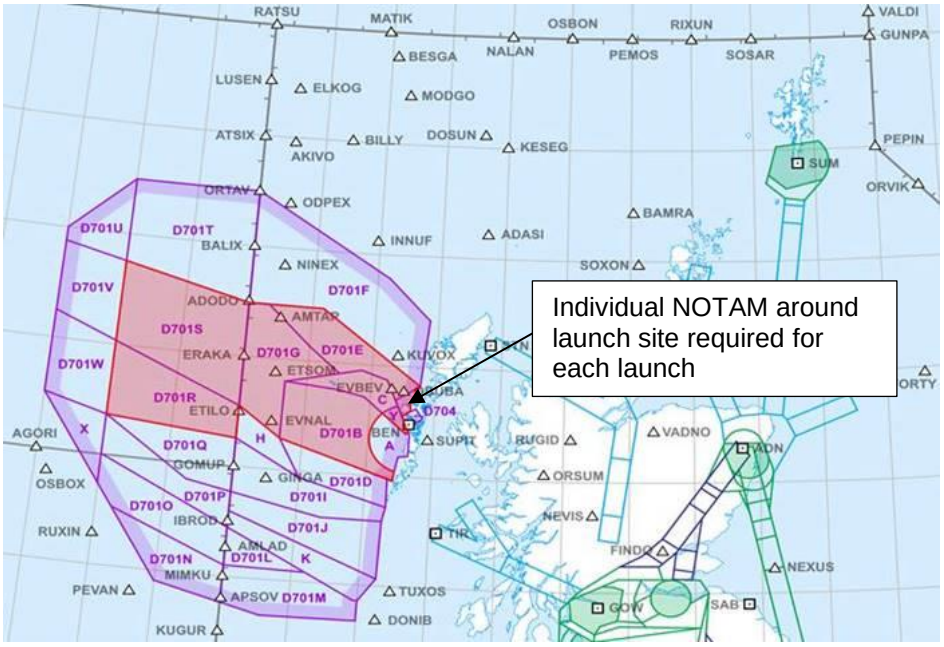


Figure 10: Option 2 - Do Minimum & Utilise D701: Diagram showing an example of D701 areas activated

5.3.4 Option 3 – New Fillet of Segregated Airspace around Launch Site and Utilise D701

This option includes the use of a new fillet of airspace around the launch site between D701 and D704 that could be activated by NOTAM in the same manner as D701. This would provide a permanent airspace solution over the launch site and provide connectivity to the D701 Danger Areas. The D701 areas could be activated in the normal manner using only those areas necessary to contain the safety trace of the rocket being launched. Both the fillet of airspace and D701 would be fully integrated into the systems and processes employed by the UK AMC and the Eurocontrol NM, enabling the harmonised and dynamic planning of the ATM network. Furthermore, this option provides the most straightforward operation for Range staff as each different sounding rocket launch would be treated in exactly the same manner as any MOD weapon firing or test and evaluation event. The new fillet of airspace would be treated as an extension of D701 for ASM purposes, and the associated D701 areas would be activated as needed to meet the safety trace requirements of the vehicle being launched. Notification, activation and deactivation would follow existing procedures and LoAs.

5.3.5 Option 4 - Construct New Bespoke Segregated Airspace Blocks From Launch Site

As many of the sounding rockets have very limited pedigree, endeavouring to accurately predict the launch profiles, and critically the safety traces, is not feasible at this stage (so far in advance of the launch). Therefore, any attempt to design new airspace blocks introduces risk unless a large bespoke modular design is created. Any such large bespoke modular design for sounding rockets would have to extend in excess of 250km west north-west from the launch site and be constructed of several different airspace blocks to enable a process of tailored activation (similar to that currently used for D701) to be adopted. With experience gained from the ACP pertaining to the redesign of the D701 areas in 2014, it is expected any such modular design would have to be largely aligned to the existing boundaries of D701 to enable minimum disruption to traffic routing to/from the OEPs at 10° west. The modular design and alignment of the D701 Danger Areas may not always occupy the absolute

minimum volume of airspace (with more airspace sometimes being activated than is absolutely necessary) however its alignment enables CAT to fly the shortest routes to/from the OEPs. Therefore, any additional unused airspace becomes largely irrelevant especially as this airspace is rarely used by anything other than CAT. For this reason, it is considered that any modular bespoke design would have to follow similar alignments to that of D701. The airspace would be fully integrated the systems and processes employed by the UK AMC and the Eurocontrol NM enabling the harmonised and dynamic planning of the ATM network.

The new airspace blocks would overlay a significant part of the existing D701 areas (see *Figure 12*) and would require careful delineation to prevent confusion; this would be particularly important when simultaneous activities were occurring (MOD use of D701 and SP-1 use of new areas). New and separate (from D701) ASM process and procedures would be required for this option.

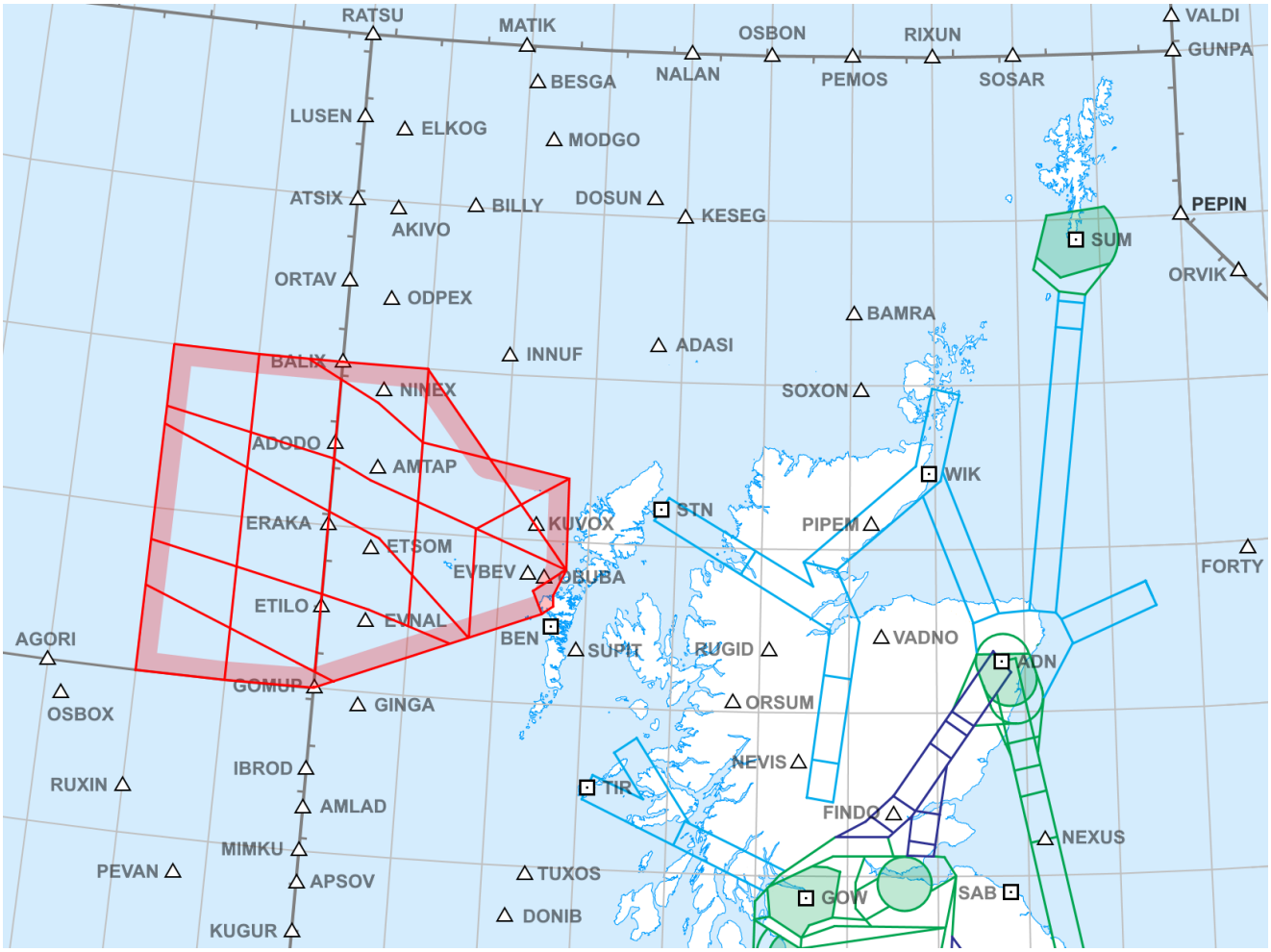


Figure 11: Option 4 - Example of what a new bespoke airspace design might look like

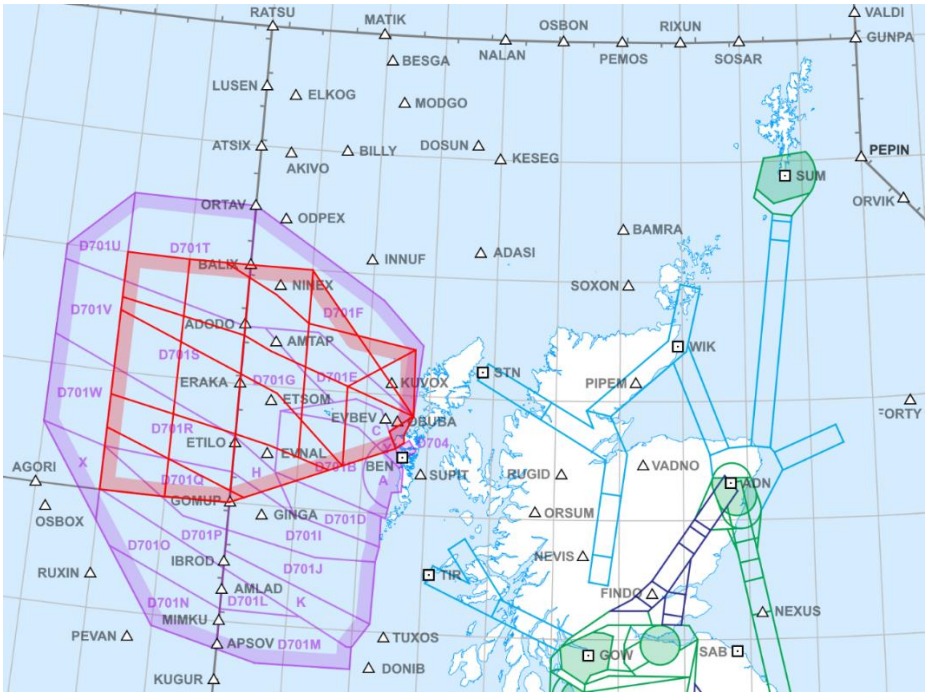


Figure 12: Option 4 – Example of what a new bespoke airspace design might look like when overlaid by the D701 complex

5.3.6 Option 5 – Use in Conjunction with Option 2 or 3 Adding Sub-division of D701B, C, D, E, & F

This option introduces a series of sub-divisions of the existing D701 areas in order to reduce the overall volume of airspace unavailable to other airspace users. The exact positions of these sub-divisions would require further work to conclude the optimum location; however, an example of what this might look like is depicted at *Figure 13.*

Whether the additional airspace made available by this option would be of benefit to other airspace users will form part of the analysis in Stage 2B of this ACP. This option would receive MOD support providing it was cost neutral to MOD; further investigation would be needed to establish if any changes to the D701 construct would be permitted as part of this ACP. If this is not the case and an additional ACP is required to modify D701, then the cost benefit analysis of this option would have to be carefully considered during Step 2B of Stage 2 to ensure the airspace gains[15] were cost-effective against any additional ACP costs, especially when balanced against the limited usage (probably only once or twice a month).

[15] The use of any additional airspace availed through these sub-divisions is likely to be limited to GAT and might not provide sufficient benefit to be cost effective.

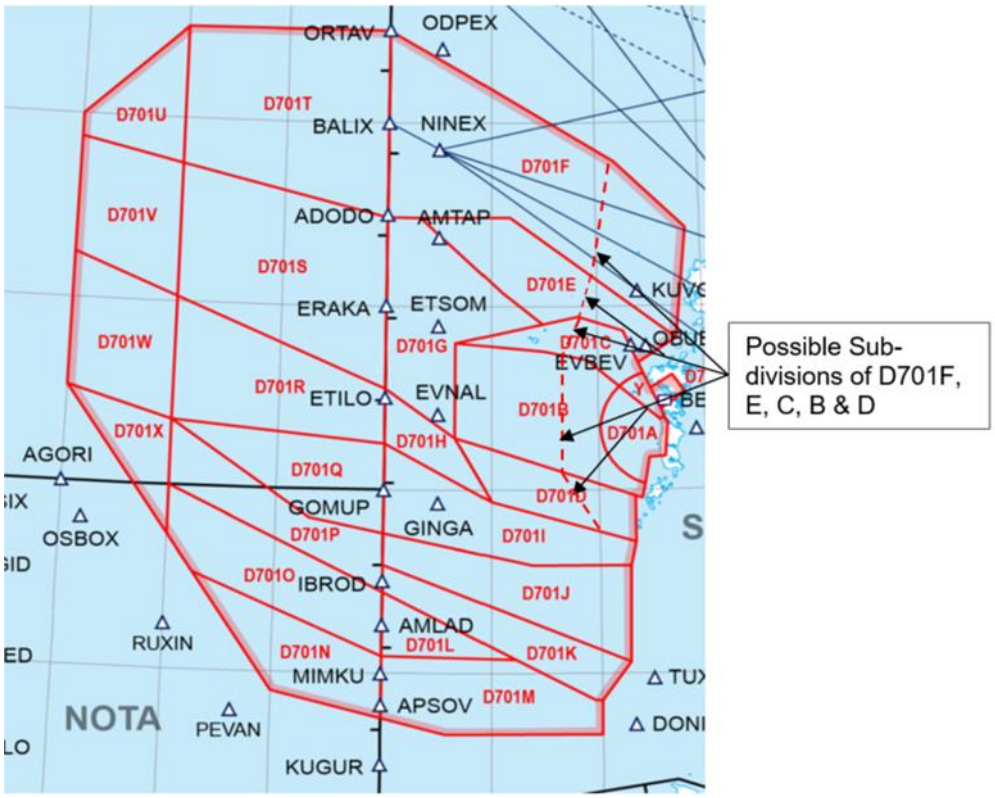


Figure 13: Option 5 – Exemplar sub-divisions of D701

Note: Options 3 to 5 include the small additional circular area of airspace around the launch site as described in paragraph 5.2

5.4 Options Summary

The following table provides a summary of proposed options:

Option	Description	Notes
0 - Do nothing	No change to current airspace	Not viable for rocket launch.
1 - Do Minimum	Design and publish unique airspace design NOTAM & AIP SUPP information for every individual launch	Temporary NOTAMs not integrated into ASM systems.
2 - Do Minimum & Utilise D701	Design and publish unique airspace design NOTAM & AIP SUPP information for airspace around launch site	Temporary NOTAMs not integrated into ASM systems.
3 - New Fillet of Segregated Airspace around Launch Site and Utilise D701	New fillet would be an extension of D701 and activated in a similar fashion	Fully integrated into ASM systems; Utilise existing ASM processes and procedures.
4 - Construct New Bespoke Segregated Airspace Blocks From Launch Site	Design a new bespoke airspace complex from the launch site extending out over D701	Require new ASM processes and procedures; Area delineation may be an issue.
5 – Adding Sub-division of D701B, C, D, E, & F	Use in conjunction with either Options 2 & 3 – sub-divisions reduce the overall airspace volume in use within D701	May need additional ACP to change D701; Additional airspace made available would have limited use.

Table 2: Summary of airspace options

5.5 Airspace Classification Options

5.5.1 Types of Airspace to Accommodate Vertical Spaceport Launches

Rocket launches and flights pose a risk to other aviation users either through mid-air collision or, following catastrophic failure of the rocket (explosion), debris impacting other aircraft. To safeguard airspace users from these risks there is a requirement to segregate the activity accordingly. This is achieved through establishing segregated airspace in one form or other.

The SP-1 launch site at Scolpaig on North Uist currently sits beneath Class G ‘uncontrolled’ airspace. This means anyone is entitled to operate in this airspace without any specific equipment, training or air traffic control. Therefore, there is no method to safeguard them from SP-1 rocket launches. In the UK there are five classifications of airspace which can all provide a method of segregation. These are detailed and assessed for suitability by the Sponsor in the table below.

5.6 Classification of Airspace Comparison A, C, D, E & G

Type of segregated airspace	Suitability for Rocket Launch	Sponsor Comment
Class A	No	- Instrument Flight Rules (IFR) flight is mandatory in class A airspace, rockets will be largely 'uncontrolled' after launch so will be unable to comply with (Air Traffic Control) ATC instructions applicable in Class A or comply with RoTA - Rockets will not be equipped with the necessary Communications Navigation & Surveillance (CNS) equipment for flights in controlled airspace - Controlled airspace is currently permanently on/active, therefore in the spirit of FUA it is not practicable to have Class A for the relatively few launches - Too restrictive on other airspace users (inability to access Class due to aircraft equipment and pilot limitations)
Class C	No	- ATC instructions mandatory in class C airspace, rockets will be largely 'uncontrolled' after launch so will be unable to comply with ATC instructions applicable in Class C or comply with RoTA - Rockets will not be equipped with the necessary CNS equipment for flights in controlled airspace - Controlled airspace is currently permanently on/active, therefore in the spirit of FUA it is not practicable to have Class A for the relatively few launches - Too restrictive on other airspace users (inability to access Class due to aircraft equipment and pilot limitations)
Class D	No	- Rockets unable to comply with ATC instructions that are mandatory in class D airspace or comply with RoTA - Inability to operate under either IFR or Visual Flight Rules (VFR) as rockets will be largely 'uncontrolled' after launch - Controlled airspace is currently permanently on/active, therefore in the spirit of FUA it is not practicable to have Class D for the relatively few launches
Class E	No	- Rockets cannot comply with IFR or VFR, or RoTA - Controlled airspace is currently permanently on/active, therefore in the spirit of FUA it is not practicable to have Class E for the relatively few launches

Type of segregated airspace	Suitability for Rocket Launch	Sponsor Comment
Class G Danger Area	Yes	- Less impact on other airspace users since it can be tactically managed (does not have notified hours of activation in UK AIP) – only activated by NOTAM when needed
Transponder Mandatory Zone (TMZ)/Radio Mandatory Zone (RMZ)	No	- Rockets may not be transponder equipped - Airspace would need to be controlled by approved ATC not Range controllers – resourcing issue - TMZ/RMZ would preclude many of the aircraft using the beach landing site at Sollas during periods when the Spaceport is not active

Table 3: Proposed Airspace Types for Consideration with Sponsor Comment

5.7 Measures to Minimise Impact on Other Airspace Users

5.7.1 Classification of Airspace

Airspace with the least restriction to other airspace users is uncontrolled Class G. This airspace still has the option to 'segregate' activity through the establishment of a Danger Area; such Danger Areas can be activated by NOTAM when needed. The Sponsor therefore proposes that the airspace classification around the launch site remains Class G[16].

5.7.2 Activation Procedures and Access to Active Danger Area

MOD Hebrides Range will manage the fillet of airspace in the vicinity of the launch site in exactly the same way as the airspace within D701 is managed when active. In essence, the new fillet of segregated airspace (and additional small circular area around the launch site) being proposed, will be treated as an extension of the D701 complex. Here MOD Hebrides Range have developed robust procedures to enable Search and Rescue (SAR) aircraft, Air Ambulance, Coastguard and other emergency services aircraft access when safe to do so. As MOD Hebrides Range manage the activity in D701, they can manage rocket launch from D701 such that the launch can be delayed in an emergency or where national security must take priority. MOD Hebrides Range will also work with local airspace users to enable admittance into the new fillet of airspace when it is safe to do so. As the airspace is likely to be activated for a period before launch, MOD Hebrides Range control staff will advise airspace users when it is safe to cross prior to and immediately after launch. For radio-equipped aircraft it is anticipated that the fillet of airspace will only prohibit access for a short period, probably less than an hour prior to launch to a few minutes after launch.

For a bespoke airspace solution for each launch that is independent to D701, access to this airspace may take longer to arrange given the volume of airspace being activated by NOTAM; however, like the small fillet of airspace around the launch site, the airspace will be released (NOTAM cancelled) almost immediately after launch as it is anticipated the rocket will only be utilising the airspace for a matter of minutes – this will only change should the rocket have a catastrophic failure or need to be destroyed,

[16] It is noted that above FL195 the airspace is Class C and Class A however, as for the D701 areas when activated (including airspace above FL195) the airspace is treated as Class G.

then there will be a more protracted period for the airspace to be active to enable the debris field to clear. This will be evaluated for each launch and shared with airspace managers and ANSPs in advance.

5.8 Utilisation of Airspace

5.8.1 Anticipated Rocket Launch Schedule

It is currently not possible to predict the actual usage of the SP-1 facility for sub-orbital rocket launches; however, under the conditions of the proposed planning application, the number of launches will be limited to 10 per year. It is expected that some months may have two or three launches and other months, particularly in the winter, will see only a single or no launch.

It is anticipated that the small Danger Area (1000m radius surface to 3000ft agl) will be needed on one or two occasions per launch up to 3 weeks in advance of any proposed launch window and for periods of several hours for 'wet rehearsal' days. The main fillet of segregated airspace will be required for a period of approximately 1-3 hours for each launch (this is necessary to enable sufficient time to clear the 'sea-space' prior to any launch). It is probable that one or two spare days will be required for each launch to mitigate against technical, weather or Foul Range[17] issues. Where practicable, a decision whether to activate the airspace will be made the day before at D minus 1 (D-1). This way the airspace can be fully utilised in the event of launch cancellation. Worst case scenario is the rocket launch is cancelled on the day in which case the NOTAM might already be active and airspace restrictions in place; this could also occur on the spare days. In order to minimise the impact on the Air Traffic Management (ATM) network, SP-1 will consider developing protocols that could include a day break between preferred launch day and any spare days to enable the ATM network to recover and reset.

Other such initiatives and protocols will also be developed, such as launch timings, to help minimise the impact on the ATM network.

6. Stakeholder Feedback

Stakeholders were asked to consider the DPs and evaluate if in their opinion each option met, partially met or did not meet the DPs. Full responses can be found at the Appendix to this report and information gained from the responses has been amalgamated in the DP evaluation below in Section 7

6.1 Feedback Received from Stakeholder Meetings and Stakeholder Returns

6.1.1 MOD – The online meeting with the MOD held 11 Oct 22 highlighted the following key points:

- Given the options presented, it was not anticipated that there would be any significant challenges moving the ACP forward from a MOD perspective.

[17] Foul Range may be caused by non-participants entering the Range safety trace area; this could include personnel or vehicles on the land area, sea-space or airspace.

- MOD input would be sought regarding Joint Warrior exercises and any potential impact the use of the small additional Danger Area around the launch site could have.
- Defence Airspace & Air Traffic Management (DAATM) considered the use of existing airspace structures that were AMC managed to be the most logical and straightforward option. It was further opined that the MOD would not oppose minor changes to the D701 areas where these were in the form of a small number of sub-divisions providing the change would be cost neutral to the MOD (other than the normal mapping and slight procedure changes necessary). It was identified that nomenclature could be an issue if additional areas were added.
- The MOD suggested that, given the small number of launches per year (10), the resource necessary to make changes to D701, for all concerned (especially NATS with new ADQ points, changes to FBZs and possibly reporting points), might not be cost effective when balanced against any airspace gains.
- It was acknowledged that the LoA between QinetiQ, MOD and SP-1 would be a critical enabler to allow rocket launch and use of D701 and Long Term Partnering Agreement (LTPA) assets – the LoA remained work in progress.
- It was highlighted that QinetiQ use of the Hebrides Range, facilities and equipment all fall under the QinetiQ and MOD LTPA and as such require MOD approval; activities therefore, follow MOD guidelines and are subject to MOD Letters of Agreement associated with Range operations. This includes Other Works Approvals (OWA), regardless of customer. It was stated that SP-1 activity still falls under MOD jurisdiction through the OWA process and consequently, use of the Range is covered under extant LoAs and ASM processes and procedures. The only difference from purely MOD sponsored activity is where liability is held. Liability for SP-1 activity would fall to the CAA through the spaceport and Range licensing process and the rocket provider's approvals and permissions.

6.1.2 **MOD Formal Response – The key points from the MOD formal response are detailed below; a full copy is contained at the Appendix to this report:**

- Options 0, 1 and 2 do not meet as many of the DPs as Options 3 to 5. Full ASM processes for activation of the airspace should be followed to ensure the most efficient flexible use of the airspace between civil and military, which Options 3 to 5 all appear to utilise and Options 1 and 2 don't.
- Options 4 and 5 will require new Special Use Airspace (SUA) or changes to existing SUAs which may increase the complexity of the airspace in that area. MOD would be happy to explore further subdivisions.
- Further cost benefit analysis should be undertaken by the Sponsor to ensure that potential additional ACP work to subdivide or create new SUAs would be cost effective.
- In summary, Option 3 appears to be the most suitable to meet the DPs as there are existing ASM processes, protocols and SUA available; but further discussions and agreements on usage and impacts will be required.
- Negligible impact to operations, as it is adjacent to existing Danger Areas (EG D701 and EG D704). The location of the small danger area and activation times would also have negligible impact on the MOD.
- Planned frequency of launches is low enough to have minimal impact providing that activity is suitably deconflicted with planned D701 usage and other military exercises in the area (covered in Para 6.2.1 of the Letter).
- Usage of the D701 would need to be covered under the Long Term Partnering Agreement as previously discussed and acknowledged by QinetiQ.
- The UK Space Operations Centre (UK SpOC) will require the necessary launch information to satisfy their obligations.

- Acknowledgement and support of the statement in para 9.2 ref national security access to the activated Danger Area (DA).

  Sponsor Reply – Fully support the MOD feedback and work is ongoing to formalise use of D701 under the LTPA. The sub-divisions of D701 can be further simplified to reduce the number of additional areas and still meet the SP-1 requirements and that of the Hebrides Range. The UK SpOC will be afforded the necessary information to undertake their duties as this is a requirement placed on the rocket provider as part of their approvals/permissions process.

6.1.3 **NATS – Meeting held at Brettenham House London 18 Oct 22 – Key points highlighted:**

- It was confirmed that SP-1 would be able to support more than one campaign simultaneously but with only a single launch pad facility actual launches were likely to be a week or more apart. It was further confirmed that there was no intention to conduct overnight launches.
- NATS suggested the Sponsor may need to consider a Flight Restriction Zone (FRZ) to counter possible drone intrusion.
- It was agreed that the small additional circular segregated airspace around the launch site to protect SP-1 ground personnel was a valid proposal.
- NATS highlighted the requirement for SP-1 to formally request AMC involvement for the airspace to become AMC manageable.
- NATS suggested that the SIA 2018 required affected ANSPs to be a signatory on any future airspace management agreements; it is considered that this may be in the form of LoAs but there is no current guidance regarding what constitutes ‘sign off’.
- NATS stated that SP-1 launches were not state sponsored therefore could not be classified as MOD activity.
- NATS would like to see the term ‘irreducible spare capacity’ removed from the ACP correspondence as they did not consider the airspace as having irreducible spare capacity. It was explained that this statement was with reference to spare Range capacity not specifically airspace; however, to avoid any misinterpretation it was agreed this would not be included in future correspondence (it is noted that this cannot be removed from the original statement of need).
- NATS suggested that delays to CAT attributable to SP-1 launches would have to be treated separately to those attributable to MOD activity unless operating in support of MOD.
- NATS highlighted that the number of actual launches (10) was not the main issue, it was the number of minutes a volume of airspace was unavailable that counted; this should include contingency days. Therefore, duration of the launch windows would be critical as well as frequency of airspace activation, especially where launches were cancelled at late notice (with insufficient time to hand the airspace back). All had to be factored in when considering the impact on the ATM network.
- NATS explained how the Oceanic routing will change at some stage in the future with the introduction of FRA airspace where airlines can plan point to point. It was recognised that OEPs currently remained an important point to consider, especially with any potential sub-divisions to the existing Danger Area (D701) airspace structure. It was further noted that separation criteria might also be reduced against airspace reservations in Oceanic airspace at some stage (this was the subject of ongoing work within ICAO).
- NATS suggested that any sub-divisions of D701 should be analysed to identify the benefits and the number of OEPs affected should also be considered as well as time of day.

6.1.4 **NATS Formal Response – The key points from NATS formal response are detailed below; a full copy is contained at the Appendix to this report:**

- Surmised that Option 4 delivers the DPs.
- Noted that contrary to Table 2 of Engagement Letter, (surface) SFC to Unlimited (UNL) would encompass controlled and uncontrolled airspace, not just Uncontrolled Class G.
- Indicated the proposal will have impact on NATS and customer operations, dependent on a number of factors and further conversation is required.
- The biggest concern is the potential individual and cumulative impact of this and other nearby activities on scheduled airline traffic heading to/from the North Atlantic.
- Proposal implies that the use of D701 has been pre-determined as a technical solution, which would be contrary to the requirements of CAP 1616.
- As currently worded, the DPs are incompatible with Options 1 and 4 which explicitly propose an alternative solution to the use of D701. NATS suggests the Sponsor discusses with the CAA to identify an appropriate way forward.
- Notes the revised boundary of the DA element around the Spaceport 1 launch site itself (Figure 4) following Stakeholder input, and asks whether (in the interests of minimising the amount of airspace affected) the NE corner of this element could be moved further to the SW, reducing the size of the "dog leg" on the E side of this element.
- In due course, NATS will expect to see proposals from the Sponsor for Flight Plan Buffer Zones (FBZs) for at least the Domestic (Scottish FIR) components of the Danger Area complex.
- As discussed on 18th Oct 22, NATS believes modular Danger Area complex, with components sized and shaped to suit the nature of the generic types of rockets which are anticipated to use the range, is most suitable solution. Also, North Atlantic technical support systems do not work with curves, suggest a fan shape - an example is offered.

  Sponsor Reply – Option 4 will be considered in the options appraisal at Step 2B as it is accepted several DPs make specific reference to use of D701 and this should not exclude the radical option of a wholly new airspace design (this is captured in the DP evaluation for Option 4). Furthermore, Option 4 has been modified to provide a more symmetrical airspace design (see *Figure 14*). Option 5 has similarly been modified with a view of reducing the impact on OEPs and to simplify the design (see *Figure 15)*. The NE corner of the airspace 'fillet' cannot be reduced further as this would prohibit launches to the north. All other points are noted and will be addressed as the ACP process progresses.

6.1.5 **HIAL Formal Response –** The key points from HIAL are detailed:

- Surmised that Option 3 best meets the DPs.
- Assurance required that coordination can be effected to enable unrestricted operations at EGPL[18].
- SP-1 activities deconflicted from scheduled flights and emergency category A flights.
- Ensuring direct lines are available between EGPL and launch commander/operator
- Assess and consider Missed Approach Procedures (MAPs) for the Instrument Approach Procedures (IAPs) at EGPL

[18] EGPL is the ICAO designator for Benbecula airport

Sponsor Reply – Points noted and all will be addressed through the appropriate LoAs and operating procedures for SP-1.

6.1.6 **Other Stakeholder Feedback** – Two stakeholders requested additional information:

From the other 85 organisations and individuals contacted a total of 6 responded. All 6 responses confirmed 'no comment' with 3 of those stating no further engagement would be necessary: One stakeholder (CnES Planning) requested further information on the ACP process, but no formal response was subsequently received. One stakeholder asked for clarification on the safety analysis, in particular the relationship between the airspace area and the ground safety footprint with regard to debris falling over the land area.

Sponsor Reply – An explanation of the ACP process was provided and the stakeholder directed to CAP 1616 and the CAA airspace portal. The process of formal engagement and consultation was explained and it was acknowledged that there would be similar interested parties in both the airspace change and launch site planning process with both processes using the same EIA as evidence.

In response to the request for clarification on the safety analysis and ground safety footprint, the Sponsor offered the following: The safety analysis process for aircraft and the parameters for assessing the volume of airspace required to ensure safety, are different to those when considering third parties on the ground, either on the land area or affected sea space. The variables, environmental effects and probability of risk are very discrete for each environment (air, land and sea) this invokes different boundaries. Furthermore, it is common practice to have an 'air Danger Area' over a land mass but this does not mean there is a hazard to all personnel on the ground beneath this volume of airspace. EG D704, which covers Benbecula airport and the surrounding area, is a good local example; this may be activated to segregate the hazardous activity from other airspace users but it does not mean third parties on the ground beneath D704 are at risk; the ground safety footprint will determine the risk to third parties and the area cordoned off as necessary. For SP-1, this cordon is considered the boundary of the Spaceport.

6.2 Modification of Design Options

6.2.1 Following stakeholder feedback (NATS) it was decided to redesign Option 4 to better reflect a symmetrical design aligned on the SP-1 site as suggested. What such a design might look like is presented at *Figure 14*.

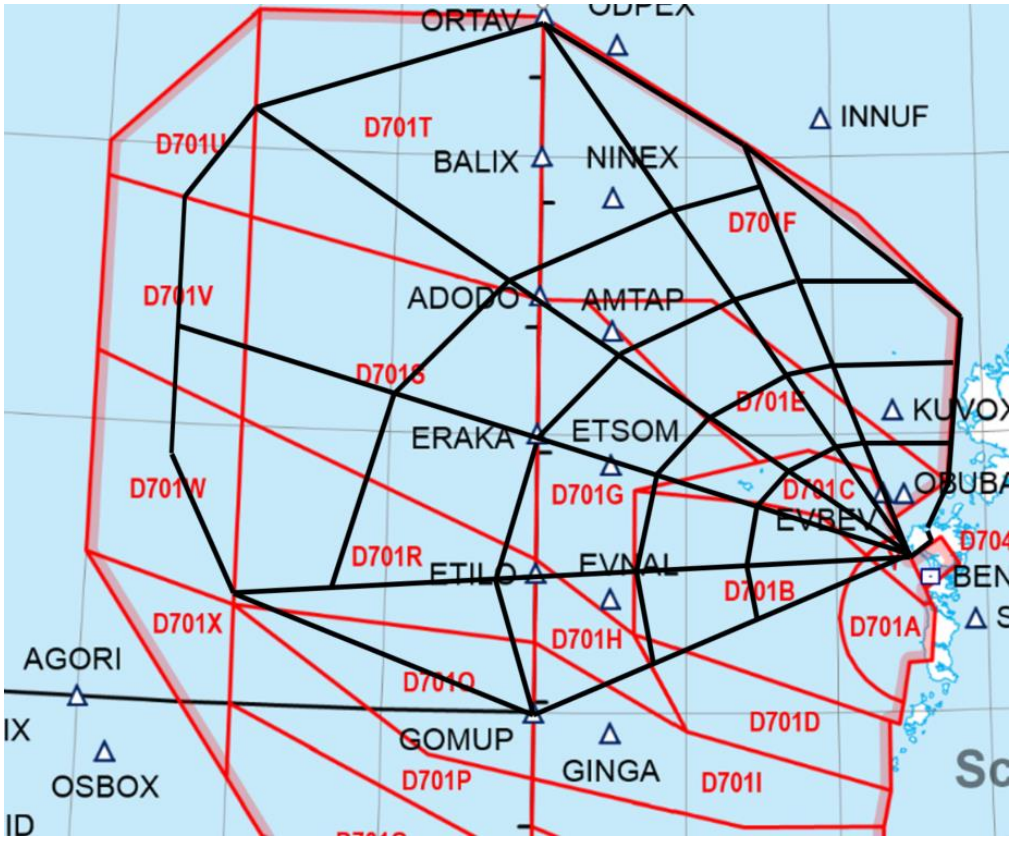


Figure 14: Option 4 revised potential design with D701 overlay

Following feedback from both NATS and MOD, the potential sub-divisions of D701 presented in Option 5 have also been revised and are shown as two different possibilities in *Figure 15*. Both possibilities are aimed at reducing the overall airspace necessary for some launches while simplifying the design without adversely impacting, to any greater extent, on OEPs. It is recognised that further work will be required to refine/sub-divide D701 if this option is taken forward as the preferred option.

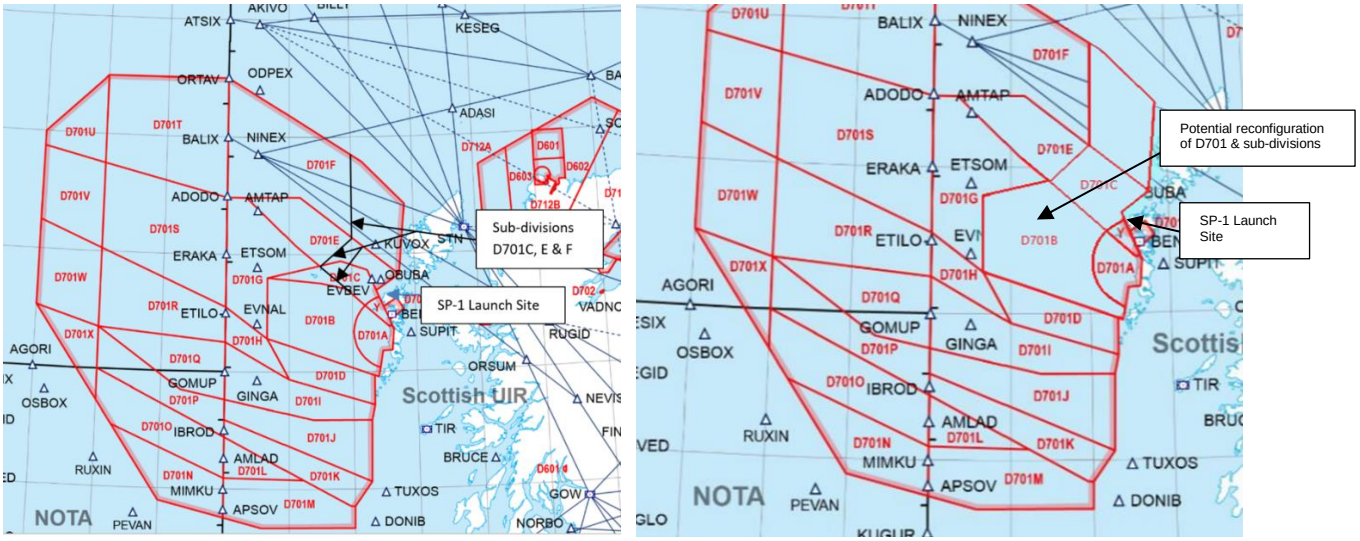


Figure 15: Two potential modifications to D701 Option 5

7. Design Principle Evaluation

The Sponsor has developed its set of design options to address the SoN and align to the DPs as agreed during Stage 1 and presented in the engagement letter. In accordance with CAP 1616 the Sponsor is required to evaluate each option against each DP. To assist in the process the Sponsor asked stakeholders to consider the airspace options presented and to offer their opinion on whether they met, partially met or did not meet the individual DPs. The DP evaluation methodology is captured in the *Table 4* below with a summary of findings detailed in the *Table 5.*

DESIGN PRINCIPLE EVALUATION METHODOLOGY				
Design Principle	How it is Evaluated	Met	Partially Met	Not Met
DP1 - The safety of all airspace users is the paramount factor in the airspace design	Does the airspace design provide suitable segregation of rocket operations from other airspace users? Note: safety of third parties on the ground or seaspace is detailed in separate but parallel work packages associated with the planning consent regulations.	Rocket operations (immediate pre-launch, launch, flight & splashdown) pose a hazard to other airspace users such that the operations need to be segregated to ensure safety	Only part of the operation is segregated	No segregation
DP2 - The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users	In ensuring safety of other airspace users the airspace design should consider the potential failure of the spacecraft both at the launch site, immediately after launch and when in flight and to splashdown. The airspace design must be of sufficient volume to contain all credible risks associated with rocket malfunction at any stage of the operation.	The overall volume of airspace should be the smallest possible but of sufficient size to contain all credible hazards associated with rocket operations	The airspace exceeds the minimum volume required to contain all credible hazards but is still designed to minimise impact on other airspace users	The airspace far exceeds the minimum volume required to contain all credible hazards and does not take into consideration other airspace users
DP3 - Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations	When considering the impact on other airspace users the new airspace should not be considered in isolation but must also take into account the consequential impact of activating numerous EG D701 areas for SP-1 operations (if this is deemed appropriate) at times when the Danger Areas may not normally be activated. This design principle includes consideration of which EG D701 areas need to be activated and their impact on other stakeholders in particular where these necessitate the closure of OEPs for the NAT tracks. It may prove beneficial to utilise D701 for sub-orbital sounding rocket activities where these can be contained wholly within the D701 complex. This DP may not be relevant if a bespoke modular design is preferred for orbital launches	Where use of D701 is part of the design option then selection of the necessary D701 areas to accommodate all credible hazards should be such that they minimise the impact on other airspace users in particular CAT	Not Applicable (this is either met or not met assessment)	D701 is not part of the airspace solution

DESIGN PRINCIPLE EVALUATION METHODOLOGY				
Design Principle	How it is Evaluated	Met	Partially Met	Not Met
DP4 - Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex	This design principle should include integration of the new airspace into the ASM processes of the existing EG D701 complex thereby minimising the need for new multifaceted standalone procedures and exploiting current Standard Operating Procedures (SOPs). This will enable timely notification of operations and swift cancellation of NOTAMs thereby freeing up airspace efficiently. Furthermore, expanding extant EG D701 procedures to include the new SP-1 airspace (both around the launch site, beyond D701 boundary or, for a bespoke solution), will enable safe access for other airspace users when deemed necessary, in particular emergency services.	The airspace around the launch site is fully integrated into the ASM processes and procedures used for D701	Extant D701 procedures are used for SP-1 operations in D701 but not for fillet of airspace around launch site where new ASM procedures are required	ASM processes & procedures for D701 and fillet of airspace around launch site are not used
DP5 - Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design	It is recognised that use of the EG D701 areas will be subject to MOD activities and priorities therefore an important design principle will be the operational integration of SP-1 activities in and around MOD use. By managing both programmes within D701, QinetiQ MOD Hebrides Range staff will be able to facilitate the most efficient use of airspace by planning deconfliction through timing and geographic D701 area selection especially where it is proven safe to conduct simultaneous operations	QinetiQ MOD Hebrides Range staff manage both MOD & SP-1 operations through the utilisation of D701	Not Applicable (this is either met or not met assessment)	D701 is not part of the airspace solution
DP6 - The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy	It is recognised that any new segregated airspace will have to comply with the CAA Buffer policy and consider FRA in the Scottish Flight Information Region (FIR) together with any associated FBZs.	Airspace design fits into existing airspace structure where FRA & associated FBZs and CAA buffer policy already applies	Airspace design requires new FBZs to be developed and new reporting points for CAT	Airspace design does not consider FRA or associated FBZs

DESIGN PRINCIPLE EVALUATION METHODOLOGY				
Design Principle	How it is Evaluated	Met	Partially Met	Not Met
DP7 - The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area	It is considered that the airspace fillet around the launch site will be relatively small in volume (due to rocket launch profiles), and therefore current traffic patterns should be unaffected. However, a holistic approach is required to consider the wider impact that subsequent activation of the EG D701 Danger Areas or any new bespoke modular airspace will have, in particular on the NAT tracks. Any deviation caused by unavailability of OEPs will have to be carefully considered in the airspace design to understand the environmental impact of additional miles flown by aircraft forced to deviate from route. It is further acknowledged that rocket launch from the site at Scolpaig will create noise and light pollution. **Note: these elements will need to be considered in the airspace operational procedures pertaining to launch timings rather than airspace design - especially where they are traded off against minimising disruption to CAT.**	D701 is part of airspace solution and extant ASM processes and procedures are used including extant LoAs that prescribe conditions to minimise the impact on CAT and OEP closures	D701 and associated ASM processes and procedures, including extant LoAs that prescribe conditions to minimise the impact on CAT and OEP closures, are **not** used and new procedures/LoAs need to be developed	The airspace design does not consider the environmental impact of re-routing CAT long distances to avoid any new airspace, an example would be an airspace design with a predominant northerly orientation from the launch site
DP8 - The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018	It is recognised that the airspace design might be influenced by the secondary legislation to the Space Industry Act (SIA) 2018. The design principles will take account for any additional legislative requirements, in particular where these are linked to the Spaceport operator licence and Range operator licence.	The airspace design provides a 'Space Range' with associated facilities as prescribed in the SIA 2018	The airspace design does not meet all the requirements for a Space Range as prescribed in the SIA 2018	The airspace design does not any of the requirements for a Space Range as prescribed in the SIA 2018
DP9 - Rocket stage drop zones may be required outside the EG D701 Areas and will need to be considered	Not Applicable for sub-orbital	Not Applicable for sub-orbital	Not Applicable for sub-orbital	Not Applicable for sub-orbital

Table 4: Design Principle Evaluation Methodology

Design Principle Evaluation			Option 0
			~~Accept~~/Reject
Do Nothing – Launch site remains within Class G unsegregated airspace; without segregation, it is considered that rocket launch could not occur due to the risk to other airspace users as rockets will have no means of complying with the Rules of The Air (RoTA)			
	Not Met	**Partially Met**	**Met**
DP1 - The safety of all airspace users is the paramount factor in the airspace design			
DP2 - The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users			
DP3 - Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations			
DP4 - Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex			
DP5 - Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design			
DP6 - The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy			
DP7 - The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area			
DP8 - The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018			
Option Rejected – This option does not meet the DPs and critically, is considered incompatible with rocket launch due to the lack of segregation. As rockets have no means of complying with the RoTA and the potential hazard associated with failure of these embryonic systems, the risk to other airspace users would be too high to be acceptable. Without segregation, the rocket operator, spaceport and Range would be unable to meet the safety criteria prescribed by regulation.			

Design Principle Evaluation		Option 1	
		~~Accept~~/Reject	
Do Minimum - Design and publish unique airspace design NOTAM & AIP SUPP information for every individual launch			
	Not Met	**Partially Met**	**Met**
DP1 - The safety of all airspace users is the paramount factor in the airspace design			
DP2 - The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users			
DP3 - Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations			
DP4 - Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex			
DP5 - Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design			
DP6 - The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy			
DP7 - The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area			
DP8 - The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018			
Option Rejected – Only fully meets two DPs and critically, due to the temporary nature of the airspace, extant ASM processes and procedures cannot be used. Furthermore, the potential for error is increased as the airspace has to be manually plotted for each individual launch, publicised and dynamically drawn into the Range and ATC systems. The airspace is not fully integrated into the ASM and flight planning systems use by airspace managers thereby inducing additional risk and longer lead in times for the airspace to be established.			

Design Principle Evaluation			Option 2
Do Minimum & Utilise D701			**~~Accept~~/Reject**
Design and publish unique airspace design NOTAM & AIP SUPP information for airspace around launch site. Use exiting D701 Areas utilising extant ASM process and procedures			
	Not Met	**Partially Met**	**Met**
DP1 - The safety of all airspace users is the paramount factor in the airspace design			
DP2 - The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users			
DP3 - Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations			
DP4 - Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex			
DP5 - Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design			
DP6 - The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy			
DP7 - The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area			
DP8 - The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018			
Option Rejected – Only fully meets three DPs and critically, due to the temporary nature of the airspace around launch site, extant ASM processes and procedures cannot be used. Furthermore, the potential for error is increased as the airspace has to be manually plotted for each individual launch, publicised and dynamically drawn into the Range and ATC systems. The airspace is not fully integrated into the ASM and flight planning systems use by airspace managers thereby inducing additional risk and longer lead in times for the airspace to be established.			

Design Principle Evaluation			Option 3
New Fillet of Segregated Airspace around Launch Site and Utilise D701			**Accept/~~Reject~~**
New Fillet would be an extension of D701 and activated in a similar fashion using extant ASM process and procedures used for D701 and D704			
	Not Met	**Partially Met**	**Met**
DP1 - The safety of all airspace users is the paramount factor in the airspace design			
DP2 - The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users			
DP3 - Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations			
DP4 - Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex			
DP5 - Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design			
DP6 - The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy			
DP7 - The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area			
DP8 - The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018			
Option Accepted as it fully meets all DPs except DP2 & DP7. Here the 'minimum airspace requirement' is not fully met. However, using extant ASM processes and procedures including relevant LoAs minimises the complexity of the SP-1 operations and use of D701. The D701 areas are fully integrated into ATM and flight planning systems used by airspace managers. Furthermore, FBZs and reporting points are already established for D701 therefore there is no requirement for these to be redefined.			

Design Principle Evaluation			Option 4
Construct New Bespoke Segregated Airspace Blocks From Launch Site			**Accept/~~Reject~~**
Design a completely new bespoke modular airspace complex from the launch site extending out over D701. New airspace would require standalone ASM processes and procedures to be developed together with the necessary LoAs			
	Not Met	**Partially Met**	**Met**
DP1 - The safety of all airspace users is the paramount factor in the airspace design			
DP2 - The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users			
DP3 - Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations			
DP4 - Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex			
DP5 - Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design			
DP6 - The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy			
DP7 - The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area			
DP8 - The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018			
Option Accepted despite not meeting DP3, 4 & 5 and only partially meeting DP2 & 7 as it is accepted that these DPs focus on the use of D701 and therefore it could be argued that Option 4 could meet DP3, 5, & 7 if the reference to D701 is removed. It is considered useful to take this radical option forward to the appraisal stage of the process to better understand the full extent of the advantages and disadvantages and to meet stakeholder expectations.			

Design Principle Evaluation			Option 5
Adding Sub-division of D701B, C, D, E, & F - Use in Conjunction With Either Options 2 & 3			**Accept/~~Reject~~**
Sub-divisions in D701 have the potential to reduce the overall airspace volume in use within D701 by activating smaller blocks of airspace to fit the safety trace			
	Not Met	**Partially Met**	**Met**
DP1 - The safety of all airspace users is the paramount factor in the airspace design			
DP2 - The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users			
DP3 - Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations			
DP4 - Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex			
DP5 - Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design			
DP6 - The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy			
DP7 - The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area			
DP8 - The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018			
Option Accepted as it fully meets all DPs with exception of DP2 & 6 however, sub-divisions in D701 should enable more airspace to be available when compared to Options 2 & 3. It is recognised that any new sub-divisions may necessitate new FBZs and additional reporting points to be established.			

Table 5: Airspace options design principle evaluation

7.1 Summary

It can be seen from the DP evaluation that two of the six options largely align with the DPs while addressing the SoN; namely Options 3 & 5. Despite Option 4 not meeting many of the DPs as they are prescribed, the Sponsor accepts NATS's point that several DPs are associated with the use of D701 and therefore any bespoke design will not meet the DP. It is therefore recognised that without the reference to D701 then Option 4 would meet more of the DPs and it is on this basis that it is considered appropriate to take Option 4 forward into Step 2B so the virtues can be properly assessed and compared to the other remaining options. The stakeholder feedback and DP evaluation indicates the options should be placed in the order of Option 3, Option 5 and Option 4. Option 0 is rejected as it is not viable for safe rocket launch, and Options 1 and 2 fail to meet all the DPs largely due to the temporary nature of the airspace and are therefore rejected. This temporary airspace would not be fully integrated into the UK AMC or EUROCONTROL NM ASM and flight planning systems so would have to be plotted on a case by case basis. Furthermore, this would necessitate dynamic maps being constructed for each individual launch on both Range and ANSP systems.

8. Next Steps

8.1 Options Appraisal

The ACP process now moves to Stage 2 Step 2B Options Appraisal. The Sponsor will consider the three accepted options and DP evaluation, and compare against the baseline 'do nothing' to establish which option provides the best cost benefit and minimum impact on other airspace users. This qualitative assessment of each option will highlight both the positive and negative attributes of each option. Furthermore, the options appraisal will capture any potential 'trade-offs' between environmental, airspace efficiency and complexity of the airspace. Stakeholders will be informed of the outcome of the options appraisal accordingly.

9. Glossary

Acronym	Meaning
ACP	Airspace Change Proposal
ADQ	Aeronautical Data Quality
ADS-B	Automatic Dependant Surveillance–Broadcast
AGL	Above Ground Level
AIP	Aeronautical Information Publication
ANSP	Air navigation Service Provider
ASD/FS 21	At Sea Demonstration/Formidable Shield 2021
ASM	Airspace Management
AT	Atlantic Thunder
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Service
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
CNS	Communications Navigation & Surveillance
DA	Danger Area
DAATM	Defence Airspace & Air Traffic Management
DP	Design Principles
EG D	UK Segregated Airspace Designator and Danger Area
EIA	Environmental Impact Assessment
FBZ	Flight planning Buffer Zone
FIR	Flight Information Region
FRA	Free Route Airspace
FRZ	Flight Restriction Zone
FUA	Flexible Use of Airspace
GA	General Aviation
GAT	General Air Traffic
HIAL	Highlands and Islands Airports Limited
HIE	Highlands & Islands Enterprises
IAA	Irish Aviation Authority
IAP	Instrument Approach Procedures
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
LARA	Local and sub-regional airspace management support system
LoA	Letters of Agreement
LTPA	Long Term Partnering Agreement
MAP	Missed Approach Procedure
MOD	Ministry of Defence
NAT	North Atlantic Tracks
NATMAC	National Air Traffic Management Advisory Committee
NATS	NATS Holdings (Formally National Air Traffic Services)
NLB	Northern Lighthouse Board
NMPS	Non Minimum Performance Standard
NOTA	North Atlantic Transit Area

Acronym	Meaning
NOTAM	Notice to Airmen
OEP	Oceanic Entry Points
OWA	Other Works Approvals
PPP	Power Point Presentation
RF	Radio Frequency
RMZ	Radio Mandatory Zone
RoTA	Rules of The Air
SAR	Search and Rescue
SFC	Surface
SIA	Space Industry Act
SOPs	Standard Operating Procedures
SP-1	Spaceport 1
SUA	Special Use Airspace
SUPP	Supplement
TDA	Temporary Danger Area
TMZ	Transponder Mandatory Zone
UK SpOC	United Kingdom Space Operations Centre
UNL	Unlimited
VFR	Visual Flight Rules

10. References

A. CAP 1616 Fourth Edition published March 2021; online, available at: http://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=8127
B. CAA Policy Statement 20200721 Policy for the Establishment of Permanent and Temporary Danger Areas; online available at: http://publicapps.caa.co.uk/docs/33/Policy%20Statement%20Permanently%20Established%20Danger%20Areas%20and%20Temporary%20Danger%20Areas.pdf
C. Letter of Agreement between NATS (en Route) plc, MOD DE&S, AMC UK, QinetiQ Ltd, UK CAA, IAA and Shannon V1.0 effective 01 October 2020.

A Stakeholder Feedback – Raw Evidence

A.1 TDA Raw Evidence Referenced in ACP-2021-12

Tue 15/02/2022 10:52

[redacted]

FW: UC Spaceport-1 Scolpaig North Uist Temporary Danger Area Application

To SP1 ACP

You replied to this message on 15/02/2022 17:36.

Sollas + Traffic patterns + 1nm circles.jpg
239 KB

Sollas + Traffic patterns + 1nm circles + proposed boundary.jpg
280 KB

This is a resend[redacted]as my system tells me that my first one (underlying) did not land with you. ☺

[redacted]

Sent: 14 February 2022 11:48
To: 'SP1ACP@qinetic.com' <SP1ACP@qinetic.com>
[redacted]
Subject: UC Spaceport-1 Scolpaig North Uist Temporary Danger Area Application

[redacted]

UC ACP-2021-37 SPACEPORT-1 SCOLPAI

My name is [redacted] and I am a committee member of the Highlands & Islands Strut of the Light Aviation Association (LAA). Within our committee I specialise in airspace matters, and in particular in our response to new ACPs. Given that background, it is perhaps unsurprising to you that I am responding to the above ACP for which you are the Qinetic sponsor.

I am pleased that you have contacted [redacted] about the potential impact of the ACP on light aircraft operations at Sollas Beach. I am a little surprised however, why it has taken so long for you to contact her, given that your proposal was dated the 17th of November 2021 and that the Sollas beach landing strip is clearly marked on the CAA chart? (*I have just looked out Edition 16 of the 1:500,000 chart, dated 1995, and it was marked then*).

You have no doubt been made aware that each year we hold one of our fly-ins at Sollas Beach. It is scheduled to happen over a weekend, and whether or not it goes ahead is very much weather dependent. This may give the impression that the interface between your activation of your TDA and the fly-in is the only concern, but I must point out that our members can and do land on the beach (and others along the west coast of the Long Island) on an opportunity basis. Whatever solution that is arrived at for your TDA must therefore take this occasional usage into account as well.

As with any airstrip, it must be possible to fly both left or right circuits, depending on the wind and weather, and Sollas is no exception. It must also be possible to fly reasonable approach and departure routes. It follows that there must be a generous separation between the boundary of the danger area and the manoeuvring area of the light aircraft. Given that some of our aircraft do not have electrical systems, let alone conspicuity devices, that margin should sensibly be measured in terms of nautical miles.

We do of course realise that your proposal is for a temporary danger area, which will only be activated when required and will presumably be notified by NOTAM in each case (ideally with a goodly notice period). That notification will necessarily occur whatever the boundaries of the TDA, but perhaps more fundamentally it may also be possible to ameliorate the impact of the TDA on Sollas by adjusting its shape. Looking at the TDA area outlined in your proposal it does appear that your boundary proposal is displaced further to the north than is necessary? I understand that you aim to achieve low polar orbits with your rockets, but usually such rockets are able to dog-leg, and do, once at altitude?

I have attached two diagrams. In the first I show the approach patterns in each direction to the beach at Sollas, and on it I have marked one nautical mile radius around the turning point to finals which reflect a degree of uncertainty of position according to wind conditions, etc. On the second I have marked the effect of these "variability" circles were you to accept a "dog-leg" in your TDA zone as drawn. An altered TDA boundary such as this would seem to eliminate the conflict with Sollas Beach without squeezing the TDA area too much, and I would welcome your comment on our suggestion.

The last point that I would make at this junction is one of a need for consultation with all stakeholders. I would be grateful if you would include me and [redacted]e on your distribution list for future correspondence relevant to your TDA. This will hopefully ease the whole process for you and lead to greater harmony all round! As with [redacted]recent email to you, I would also be grateful if you would forward a copy of this email to the CAA airspace team.

Kind Regards,

[redacted]
LAA Highland Strut

SPACE PORT 1

Wed 09/02/2022 11:07

[redacted]

RE: UC Temporary Danger Area Application for Spaceport 1 Scolpaig North Uist

To SP1 ACP

Cc BenbATC; [redacted]

You replied to this message on 09/02/2022 17:27.
This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

PL-PE.PNG 231 KB	PE-PL.PNG 240 KB	PL-PF.PNG 249 KB	PF-PL.PNG 261 KB	PL-PO.PNG 151 KB	PO-PL.PNG 152 KB

Morning[redacted]

Please find attached some images from our flight planning software for the following flight-planned pairs:

EGPO-EGPL: flight planned route DCT SAY DCT BEN DCT FL060 – file PO-PL;
EGPL-EGPO: flight planned route DCT BEN DCT STN DCT FL070 – file PL-PO;
EGPF-EGPL: flight planned route CLYDE L602 BRUCE Y958 TOBMO DCT BEN DCT FL140 – file PF-PL;
EGPL-EGPF: flight planned route DCT BEN DCT TOBMO Y968 BRUCE FL130 – file PL-PF;
EGPE-EGPL: flight planned route DCT BEN DCT FL100 – file PE-PL;
EGPL-EGPE: flight planned route DCT RIMOL FL090 – file PL-PE.

The green routes are the filed alternates. All routines filed IFR. Hope this helps.

Regards,

[redacted]
Manager Flight Support

[redacted]

Loganair Scotland's Airline FlySafe CLEAN & HEALTHY

From: SP1 ACP <SP1ACP@qinetiq.com>
Sent: 08 February 2022 11:35
[redacted]
Subject: RE: UC Temporary Danger Area Application for Spaceport 1 Scolpaig North Uist
Importance: High

CAUTION: — This email originated from outside of the organisation. Do not click links or open attachments unless you are sure the content is safe even if you know the sender.

[redacted]

If you could have the information back to me as soon as possible that would be most useful, ideally by the 14th before you depart. The CAA are pressing us on providing evidence to support the statement that traffic patterns below 7000ft will not be unduly affected by the activation of the TDA. We made this assumption based on Range local knowledge (and observation of flight profiles), your response; that you did not believe the TDA would adversely affect your operations; and, the fact there are very few scheduled flights in/out of Benbecula, in particular post 1400UTC. However, the CAA were not satisfied with assumptions and need evidence, ideally from yourselves. Sorry to be a burden.

Kind Regards

[redacted]

SPACE PORT 1

Reply Reply All Forward

Thu 10/02/2022 09:24

[redacted]ganair.co.uk>

Re: UC Temporary Danger Area Application for Spaceport 1 Scolpaig North Uist

To SP1 ACP

Cc BenbATC; [redacted]

You replied to this message on 10/02/2022 12:57.

This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

Morning [redacted]

No idea of the summer schedule. We used to get pre-notified of the timetable but the company is dynamically managing things at the moment depending on forward bookings. I would estimate no more than 6 flights per day on average, including freight.

Regards,

Get Outlook for iOS

From: SP1 ACP <SP1ACP@qinetiq.com>
Sent: Wednesday, February 9, 2022 5:27:27 PM
[redacted]
Subject: RE: UC Temporary Danger Area Application for Spaceport 1 Scolpaig North Uist

CAUTION: — This email originated from outside of the organisation. Do not click links or open attachments unless you are sure the content is safe even if you know the sender.

[redacted]

Many thanks for the detail of your routes, most helpful. Is it possible to have a rough idea of your summer schedule for both pax and cargo flights; I am particularly interested in the number of flights per day to/from Benbecula.

Kind Regards

[redacted]

QINETIQ

Connect with us:

SPACE PORT 1

Reply Reply All Forward

Thu 03/02/2022 15:10

SP1 ACP

RE: UC Temporary Danger Area Application for Spaceport 1 Scolpaig North Uist

To [redacted]

Cc 'BenbATC'; SP1 ACP [redacted]

20211117_TDA_ENGAGEMENT_Letter_Timeline_Update_V1.pdf
893 KB

Good Afternoon [redacted]

I contacted you and other stakeholders at the end of last year to inform you that the TDA planned for Spaceport-1 (SP-1) site at Scolpaig North Uist, had been delayed until later this year (letter attached). We are now aiming for a June activation assuming planning applications and other elements are completed in time. On submission of the TDA proposal report to the CAA, they have asked for more evidence to my claim that traffic patterns below 7000ft will be unaffected by the TDA activation. As you are the only operator flying regularly in/out of Benbecula I wonder if you could assist me in this matter?

The attached letter provides a diagram depicting the shape of the TDA and my understanding from you previously, was that this would not unduly affect your flight profiles in and out the airport. I wonder if you could therefore provide me with the following:

- Nominal routes flown to all runways for flights both to/from Glasgow and Stornoway (ideally lines drawn on a half or quarter mil chart)
- Confirmation that these routes and procedures into Benbecula are unaffected by the TDA
- Typical summer flight schedule for both passenger and cargo flights in/out Benbecula
- If any route/procedure is affected in any way by the TDA; what the change in route flown might look like (as we are expected to identify any new areas of habitation that might need to be overflown due to the TDA being active – again lines on a chart would be most helpful)
- Any other concerns or issues we should consider in relation to the TDA.

Your assistance in this matter would be greatly appreciated.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

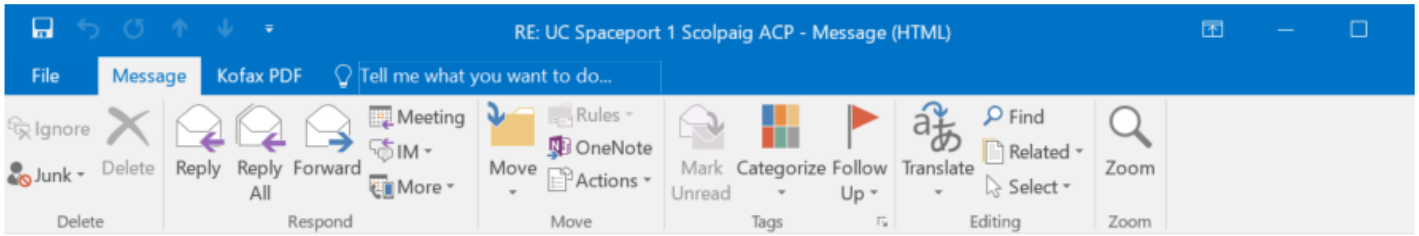
[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

SPACE PORT 1



Wed 17/03/2021 16:22

[redacted]@loganair.co.uk>

RE: UC Spaceport 1 Scolpaig ACP

To [redacted]

Cc [redacted]

Follow up. Start by 18 March 2021. Due by 18 March 2021.
You replied to this message on 18/03/2021 08:57.

Afternoon [redacted]

Thanks for this slide deck, and the one for Exercise Formidable Shield. The only impact from FS will be mitigating against any [redacted] associated with it; the spaceport shouldn't have any impact on us – apart from increased passenger numbers!

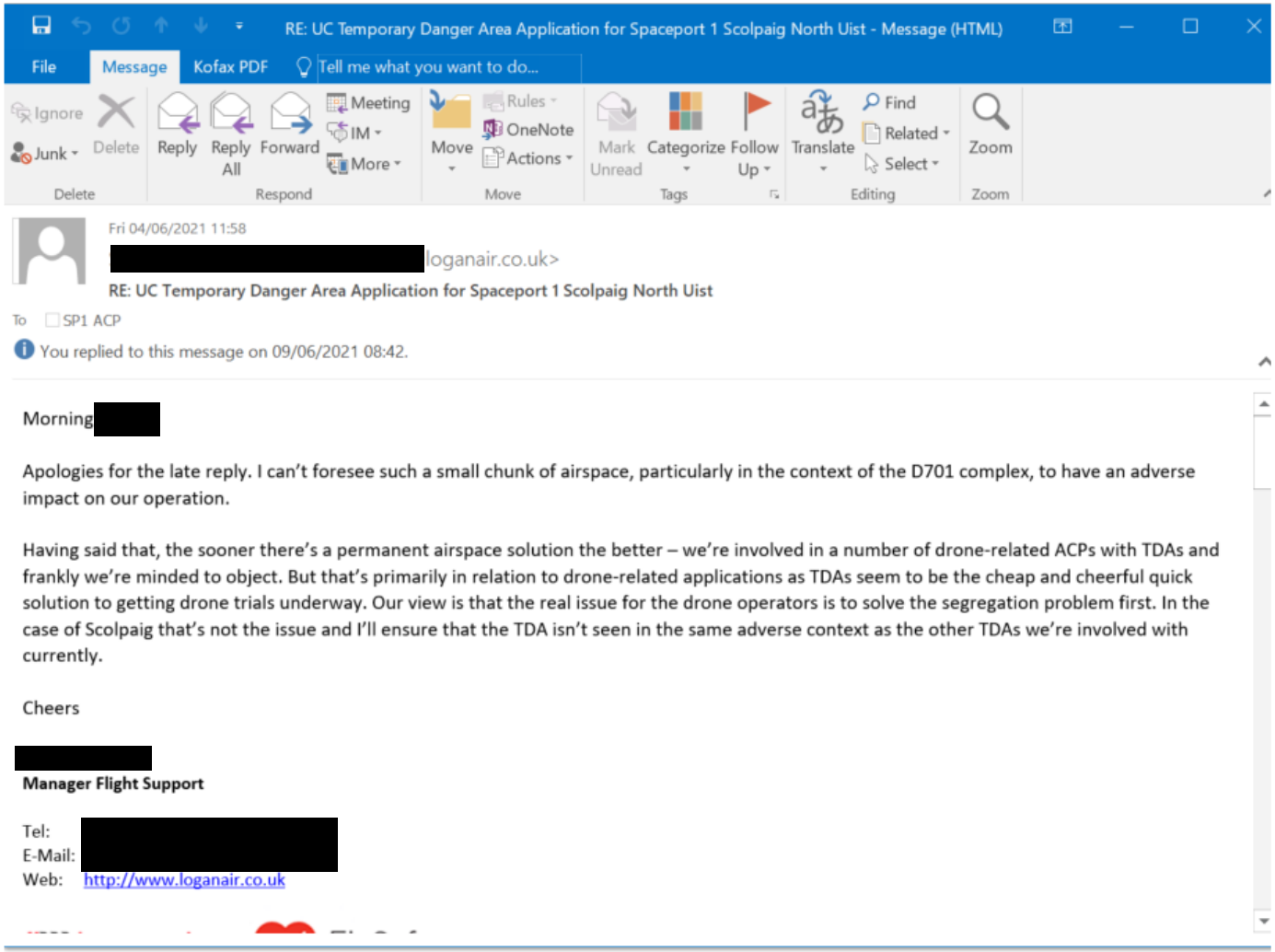
Regards,

[redacted]

Manager Flight Support

Tel: [redacted]
E-Mail:
Web: http://www.loganair.co.uk

Loganair Scotland's Airline FlySafe CLEAN & HEALTHY


RE: UC Temporary Danger Area Application for Spaceport 1 Scolpaig North Uist - Message (HTML)
File
Message
Kofax PDF
Tell me what you want to do...
Ignore
Junk
Delete
Reply
Reply All
Forward
Meeting
IM
More
Move
Rules
OneNote
Actions
Mark Unread
Categorize
Follow Up
Translate
Find
Related
Select
Zoom
Delete
Respond
Move
Tags
Editing
Zoom
Fri 04/06/2021 11:58
[redacted]loganair.co.uk>
RE: UC Temporary Danger Area Application for Spaceport 1 Scolpaig North Uist
To SP1 ACP
You replied to this message on 09/06/2021 08:42.
Morning [redacted]
Apologies for the late reply. I can't foresee such a small chunk of airspace, particularly in the context of the D701 complex, to have an adverse impact on our operation.
Having said that, the sooner there's a permanent airspace solution the better – we're involved in a number of drone-related ACPs with TDAs and frankly we're minded to object. But that's primarily in relation to drone-related applications as TDAs seem to be the cheap and cheerful quick solution to getting drone trials underway. Our view is that the real issue for the drone operators is to solve the segregation problem first. In the case of Scolpaig that's not the issue and I'll ensure that the TDA isn't seen in the same adverse context as the other TDAs we're involved with currently.
Cheers
[redacted]
Manager Flight Support
Tel:
E-Mail:
Web: http://www.loganair.co.uk

A.2 ACP-2021-12 Raw Evidence

Reply Reply All Forward IM

SP1 ACP [redacted] Tue 14:37

UC Spaceport-1 ACPs - Stage 2 Airspace Options Meeting

Dear [redacted]

I am conscious that it has been some time since I have been in contact with you regarding the SP-1 ACPs namely; ACP-2021-12, SP-1 Perm airspace solution and ACP-2021-37, SP-1 TDA proposal. I thought it timely that I provided a quick update as to where we are with both ACPs.

For the TDA (ACP-2021-37), this remains on hold until we know exactly when the first sub-orbital sounding rocket provider is likely to have their permissions/approvals from the CAA however, we are expecting this to be no later than April 2023. We will write out to stakeholders when a decision has been made.

For the permanent solution (ACP-2021-12), we are looking to commence Stage 2 Step 2A next month, we had hoped to start this last year but unforeseen circumstances prevented any progress. We will be writing out to stakeholders early October (if not before) with our airspace options as part of the formal engagement process. Clearly MOD is one of the main stakeholders and possibly the most affected, along with NATS, by this ACP and as such I would appreciate an early meeting with you and key staff so I can share our thoughts on what the options could look like. You early input will then help shape and inform the work going forward. I believe it would be beneficial to share the options proposal with you (as I am doing with NATS) before we commence the formal engagement process. Therefore, I am keen to set up a kick off meeting late September or early October. I can be flexible on dates and will of course travel to a MOD location of your choosing. I would be most grateful if you could let me have an idea of possible dates so I can plan accordingly. I will send you our thoughts on the various airspace options ahead of the meeting.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

QINETIQ

Connect with us:

SPACE PORT 1

Reply Reply All Forward IM

SP1 ACP [redacted] 18/08/2(

RE: UC Spaceport 1 Scolpaig TDA - NATS Response Regarding the FBZ Options

Dear [redacted]

I am conscious that it has been some time since I have been in contact with you regarding the SP-1 ACPs namely; ACP-2021-12, SP-1 Perm airspace solution and ACP-2021-37, SP-1 TDA proposal. I thought it timely that I provided a quick update as where we in both processes.

For the TDA (ACP-2021-37), this remains on hold until we know exactly when the first sub-orbital sounding rocket provider is likely to have their permissions/approvals from the CAA however, we are expecting this to be no later than April 2023. We will write out to stakeholders when a decision has been made.

For the permanent solution (ACP-2021-12), we are looking to commence Stage 2 Step 2A next month, we had hoped to start this last year but unforeseen circumstances prevented any progress. We will be writing out to stakeholders early October (if not before) with our airspace options as part of the formal engagement process. Clearly NATS are one of the main stakeholders and possibly the most affected by this ACP I would therefore appreciate an early meeting with you and key staff so I can share our thoughts on what the options should look like so you can help shape and inform the work going forward. I believe it would be beneficial to share the options proposal with you and the NATS team before we commence the formal engagement process. Therefore, I am keen to set up a kick off meeting late September or early October. I can be flexible on dates and will of course travel to a NATS location of your choosing. I would be most grateful if you could let me have an idea of possible dates so I can plan accordingly. I will send you our thoughts on the various airspace options ahead of the meeting.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

ACP-2021-12 Stage 2A - SP-1 Airspace Design Options - Discussion Points from Meeting held (virtually) between QinetiQ (QQ) and MOD on 11 Oct 22

In Attendance:

[redacted] – DAATM & Meeting Facilitator
[redacted] DAAM
[redacted] - DAATM
[redacted]) – SO1 ATM (Policy)
[redacted] - QQ Range advisor to MOD
[redacted] - QQ ACP Sponsor & Meeting Chairman
[redacted] – QQ ATM SME
[redacted] – QQ Project Manager
[redacted] - SP-1 Operations Director

Introductions were made, [redacted] explained that despite being QinetiQ staff, she was playing an impartial role in support the MOD by providing a 'Range' perspective; [redacted] part of the SP-1 team.

[redacted] stated the aim of the meeting was to present the rationale for the airspace options contained in the formal engagement letter and gain any early feedback from the MOD, conscious they had only had exposure to the options 24 hours in advance. It was identified that as use of the Hebrides Range Danger Areas D701 was a critical element of the ACP, an early meeting with MOD was considered appropriate ahead of other stakeholders. It was further suggested that this would be a good opportunity to identify any key work strands that should be considered.

[redacted] explained the de-scoping of the ACP and removal of the orbital launch airspace options and how this was directly linked to the site planning application. It was acknowledged that should orbital become a future option this would be subject to an additional ACP and planning consent.

The process for providing a formal response was explained.

[redacted] stated that he would circulate the letter to a wider MOD audience although this would be limited given the de-scoping of the ACP. However, given the options presented he did not foresee any significant challenges going forward although he would request [redacted] nput regarding Joint Warrior, especially the use of the small additional Danger Area around the launch site which could conceivably be active during JW for wet rehearsals or rocket preparation. A formal response would be crafted accordingly.

DAATM collectively considered the use of existing airspace structures that were AMC managed, to be the most logical and straightforward option. It was further opined that the MOD would not oppose minor changes to the D701 areas where these were in the form of a small number of sub-

divisions providing the change would be cost neutral to the MOD (other than the normal mapping and slight procedure changes necessary). However, given the small number of launches per year (10), it was suggested that the resource necessary to make changes to D701, for all concerned (especially NATS with new ADQ points, changes to FBZs and possibly reporting points), might not be cost effective when balanced against any airspace gains.

[redacted] agreed the DATAM sentiment.

[redacted] raised the issue regarding [redacted] agencies. [redacted] explained that any rocket launches would still fall under the LTPA between QinetiQ and MOD and these would come under the Other Works Approvals (OWA) process; furthermore this precedence had already been set at other Ranges. It was acknowledged that the LoA between QinetiQ, MOD and SP-1 would be a critical enabler to allow rocket launch and use of D701 and LTPA assets – the LoA remained work in progress. [redacted] explained that the agreed approach to the TDA could work for the permanent solution where: *"QinetiQ use of the Hebrides Range, facilities and equipment all fall under the QinetiQ and MOD LTPA and as such require MOD approval; activities therefore, follow MOD guidelines and are subject to MOD Letters of Agreement associated with Range operations. This includes OWA, regardless of customer. It is argued that SP-1 activity still falls under MOD jurisdiction through the OWA process and consequently, use of the Range is covered under extant LoAs and ASM processes and procedures"*. The only difference pertaining to purely MOD sponsored activity is liability. Here this would fall to the CAA through the spaceport and Range licensing process and the rocket provider's approvals and permissions.

[redacted] raised the potential issue regarding D701 nomenclature issues but it was agreed that this could be addressed later in the process if indeed this was seen as a viable option.

[redacted] stated that the DAATM were content for the Sponsor to liaise directly with the DAAM providing the DATAM were kept informed.

The meeting was concluded and [redacted] thanked all for their participation.

Draft record of discussions produced by [redacted] QinetiQ

11 Oct 22

SPACE PORT 1

Reply Reply All Forward IM

SP1 ACP [redacted] + 36

UC ACP-2021-12 - Spaceport-1 Scolpaig North Uist Airspace Change Stage 2A Airspace Options Engagement

20221011_FIXED_SubOrbital_ONLY_Airspace_Design_Options_Letter_FINAL.pdf
3 MB

Dear NATMAC Member,

We are writing to you in our capacity as Sponsor for the above titled airspace change; please see attached our engagement letter. The ACP has entered Stage 2 of the process and in accordance with CAP 1616 we have developed a number of airspace options that we would like to share with you for consideration. We would kindly ask that you respond to the undersigned with your feedback no later than Wednesday 09th November (in 4 weeks). Full details of the airspace change can be found on the CAA airspace portal found here: Airspace change proposal public view (caa.co.uk)

It should be noted that there is an additional ACP active for Spaceport-1 relating to the establishment of a temporary Danger Area (TDA). This ACP (ACP2021-37) remains in progress and should not be confused with the above.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

SPACE PORT 1

Reply Reply All Forward IM

Brundle, Paul R [redacted] + 39 1 1

UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

20221011_FIXED_SubOrbital_ONLY_Airspace_Design_Options_Letter_FINAL.pdf
3 MB

Dear Stakeholders,

We are writing to you in our capacity as Sponsor for the above titled airspace change; please see attached our engagement letter. The ACP has entered Stage 2 of the process and in accordance with CAP 1616 we have developed a number of airspace options that we would like to share with you for consideration. We would kindly ask that you respond to the undersigned with your feedback no later than Wednesday 9th November (in 4 weeks). Full details of the airspace change can be found on the CAA airspace portal found here: Airspace change proposal public view (caa.co.uk)

It should be noted that there is an additional ACP active for Spaceport-1 relating to the establishment of a temporary Danger Area (TDA). This ACP (ACP2021-37) remains in progress and should not be confused with the above.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

SPACE PORT 1

Reply Reply All Forward IM

SP1 ACP [redacted] 27/09/

RE: uc RE: Spaceport 1 Scolpaig TDA - NATS Response Regarding the FBZ Options

This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

Good Morning[redacted]

I can confirm attendees for the meeting in London on the 18th Oct will be myself and[redacted] With regard specific points for discussion, I will be sending out our formal stakeholder engagement letter detailing the proposed airspace options, this week. I would very much appreciate NATS view on these options by discussing them at the meeting before you develop your formal response. Historically I have found a f-2-f meeting, where rational can be explained and questions answered, often helps stakeholders provide a more informed response. I would like to propose the following agenda:

1. Introductions – SP1
2. Background and intro to SP-1 (incl' statement of need) – SP1
3. Overview of Design Principles agreed with CAA during Stage 1 – SP1
4. Proposed airspace options:
    a. Pros and Cons from SP-1 perspective – SP1
    b. NATS view on proposed options, concerns and discussion/view – SP1/NATS
    c. Any NATS suggested option modification for Sponsor to consider - NATS
5. Summary and next steps
6. Timeline
7. AOB

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

Reply Reply All Forward IM

SP1 ACP [redacted]

1

RE: uc RE: Spaceport 1 Scolpaig TDA - NATS Response Regarding the FBZ Options

This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

NATS_Mtg_Presentation_18Oct22.pdf
1 MB

Good Morning [redacted]

Please find attached a pdf copy of the PPP that will form the main part of the agenda for our meeting at Brettenham House (Central London) on Tuesday (18th Oct). Please can you acknowledge receipt and confirm that you have also received the formal engagement letter sent out on Tuesday this week. I will bring a lap top with the PPP on, I assume you have a presentation screen I can plug into?

My aim is to arrive in London fairly early ahead of the meeting however, in the event of any rail issues, do you have a number I can contact you on should there be any delay? I Look forward to meeting you and the NATS team next week.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

From: [redacted]
Sent: 20 September 2022 15:03
To: SP1 ACP <SP1ACP@qinetiq.com>; [redacted]
Cc: [redacted]
Subject: RE: uc RE: Spaceport 1 Scolpaig TDA - NATS Response Regarding the FBZ Options

Good Afternoon [redacted]

The morning of Tuesday 18th would work for us.

I've reserved the Board Room from 10am, what start time would best suit your travel arrangements?

Kind Regards

SPACE PORT 1

Reply Reply All Forward IM

SP1 ACP [redacted]

UC Spaceport 1 Scolpaig - Airspace Design Options

This message was sent with High importance.

Good Afternoon [redacted]

You should have received our formal 'airspace design options engagement' letter this morning and we hope you will have time to consider these options ahead of our meeting next week (a formal response is not needed until early November). We had intended sending the letter out earlier however, we have made a major change to the ACP insomuch that we are only considering sub-orbital rockets in this ACP, (a separate ACP will need to be raised for orbital launch in the future). This does simplify the airspace options that need to be considered and will hopefully expedite the process. In essence, the permanent airspace change is very similar to that proposed during the TDA engagement period.

We look forward to meeting you all next week and if you have any questions in the meantime please do not hesitate to contact me.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

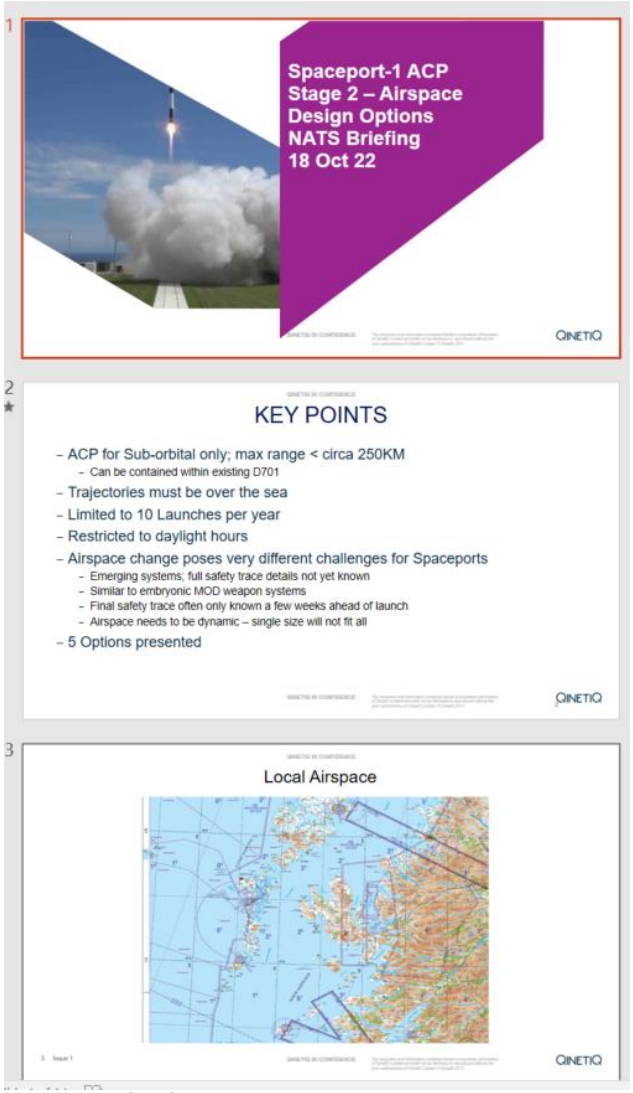
From: [redacted]
Sent: 26 September 2022 10:59
To: SP1 ACP <SP1ACP@qinetiq.com>
Cc: [redacted]
<AF
Subject: RE: uc RE: Spaceport 1 Scolpaig TDA - NATS Response Regarding the FBZ Options

Many Thanks [redacted]

I will arrange for you all to be booked in.

So we can prepare accordingly, could you please confirm the specific points you'd like to discuss?

Kind Regards


1
Spaceport-1 ACP
Stage 2 – Airspace
Design Options
NATS Briefing
18 Oct 22
QINETIQ
2
KEY POINTS
– ACP for Sub-orbital only; max range < circa 250KM
– Can be contained within existing D701
– Trajectories must be over the sea
– Limited to 10 Launches per year
– Restricted to daylight hours
– Airspace change poses very different challenges for Spaceports
– Emerging systems; full safety trace details not yet known
– Similar to embryonic MOD weapon systems
– Final safety trace often only known a few weeks ahead of launch
– Airspace needs to be dynamic – single size will not fit all
– 5 Options presented
QINETIQ
3
Local Airspace
QINETIQ

4

SP-1 Location in Relation to D701 Areas & Adjacent VL Spaceports

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5

Segregated Airspace Requirement Around Launch Site

- TDA engagement process revealed issue with Sollas landing site
- TDA timeline precluded additional safety analysis to support re-profiling
- Subsequent TDA delay enabled further analysis and re-profiling demonstrated as safe

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6

Additional Small Circular Area to Protect Ground Personnel

- Experience from FS highlighted potential risk to SP-1 personnel servicing rocket
- Protect from noise/distraction low flying a.c.
- Protect from possible HF interference caused by a.c. systems

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AIRSPACE
OPTIONS

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Option 0 – Do Nothing (Not Viable)

Option 1 – Do Minimum

- Do Minimum - Design and publish unique airspace design NOTAM & AIP SUPP information for every individual launch (10 per year).
- Pros:
  - Uses minimum amount of overall airspace
- Cons:
  - Not integrated into ASM systems
  - Not AMC managed
  - Not marked on Nav charts
  - Increase in effort (TOIs, plotting, dynamic maps etc)
  - Long lead in time/AIRAC cycle

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Option 2 – Do Minimum & Utilise D701

- Design and publish unique airspace design NOTAM & AIP SUPP information for airspace around launch site (Fillet)
- Pros:
  - D701 fully integrated & well known/understood
- Cons:
  - Fillet not AMC managed
  - Not integrated into ASM systems
  - Not marked on Nav charts
  - Might need TOIs etc
  - Long lead in time/AIRAC
  - Potential to use more airspace than single NOTAM Option 1 or Option 5

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Option 3 – New Fillet of Segregated Airspace around Launch Site and Utilise D701

- New Fillet would be an extension of D701 and activated in a similar fashion
- Pros:
  - Fully integrated into ASM systems
  - Marked on Nav charts
  - Extension of current SOPs
  - ASM staff fully familiar with process & procedures
  - Use extant LoAs (modified)
  - Short lead in time (D-21) notification
  - Delays classified as attributable to MOD activity (reporting period 3 settlement)*
- Cons:
  - Potential to use more airspace than Options 1 & 5

* See notes.

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Option 4 – Construct New Bespoke Segregated Airspace Blocks From Launch Site

- Design a new bespoke airspace complex from the launch site extending out over D701
- Pros:
  - Fully integrated into ASM systems
  - Marked on Nav charts
- Cons:
  - Would require new ASM agreements
  - Would require new SOPs and LoAs
  - ASM staff learn new process & procedures
  - Require new FBZs and reporting points
  - Potential to use more airspace than Options 1 & 5
  - All new Ref points will require to be ADQ approved

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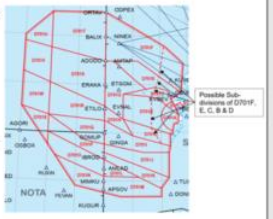
Option 5 – Adding Sub-division of D701B, C, D, E, & F

- Use in Conjunction With Either Options 2 & 3 – Applying Sub-divisions within D701
- Pros:
  - As for Option 3
  - Reduces overall volume of airspace
- Cons:
  - Resource to amend D701 (ADQ, Charts, Procedures, LoAs) balanced against infrequent use
  - Potential to use more airspace than Option 1
  - Same as Option 1 Ref Fillet around site



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Airspace Design Options - Summary

Option	Description	Notes
0 - Do nothing	No change to current airspace	Not viable for rocket launch.
1 - Do Minimum	Design and publish unique airspace design NOTAM & AIP SUPP information for every individual launch	Temporary NOTAMs not integrated into ASM systems.
2 - Do Minimum & Utilise D701	Design and publish unique airspace design NOTAM & AIP SUPP information for airspace around launch site.	Temporary NOTAMs not integrated into ASM systems.
3 - New Fillet of Segregated Airspace around Launch Site and Utilise D701	New Fillet would be an extension of D701 and activated in a similar fashion	Fully integrated into ASM systems; Utilise existing ASM processes and procedures.
4 - Construct New Bespoke Segregated Airspace Blocks From Launch Site	Design a new bespoke airspace complex from the launch site extending out over D701	Require new ASM processes and procedures; Area delineation may be an issue.
5 – Adding Sub-division of D701B, C, D, E, & F	Use in Conjunction With Either Options 2 & 3 – Sub-divisions reduce the overall airspace volume in use within D701	May need additional ACP to make changes to D701; Additional airspace made available would have limited use.

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Airspace Options for SP-1

Questions & Discussion

QINETIQ

QINETIQ

SP-1 Airspace Change Manager

Room 113 AT Building
QinetiQ Malvern Technology Centre
St Andrews Road
Malvern
Worcestershire
WR14 3PS

11th October 2022

ACP-2021-12 – Spaceport 1 North Uist Stage 2 Step 2A Airspace Design Options – Stakeholder Engagement

1 Introduction

1.1 Purpose

This document forms part of the airspace change process as defined in Civil Airspace Publication (CAP) 1616. ACP-2021-12 was commenced in 2021 to enable the launch of both sub-orbital sounding rockets and orbital small satellite rockets from the Spaceport 1 (SP-1) site at Scolpaig, North Uist on the Outer Hebrides. However, the planning application for the SP-1 site only includes sub-orbital rocket launches and therefore orbital small satellite rocket launches have since been removed from this ACP. The airspace change Sponsor is QinetiQ Ltd who form part of the SP-1 consortium led by the local council, Comhairle nan Eilean Siar, and comprising Highlands & Islands Enterprises (HIE) as well as private investors.

It is evident that vertical launch rockets will pose a risk to other airspace users and, as for other such hazardous activities, there is a requirement for segregation. This can be achieved through a number of different airspace classifications and airspace design options, which are presented in this letter.

The purpose of this letter is to enable all stakeholders the opportunity to comment on the design options presented, help shape the design and inform the airspace classification discussion. You or your organisation have been identified as a stakeholder in the ACP process and as Sponsor for the airspace change, we would very much like your feedback on the design options presented.

It should be noted that this engagement request is concerned purely with the final permanent airspace solution for SP-1 under ACP-2021-12. This should not be confused with the engagement process regarding a Temporary Danger Area (TDA) for sub-orbital rocket operations from the same site; ACP-2021-37 refers.

2 Layout of this Letter

2.1 Sections

Section 1 - Introduction
Section 2 - Layout of letter
Section 3 - Statement of Need
Section 4 - Airspace Design Principles
Section 5 - Local and Adjacent Airspace Overview
Section 6 - Design Options - Considerations
Section 7 - Airspace Options
- Airspace Fillet
- Sub-orbital Launch

Section 8 - Airspace Classification Options
Section 9 - Measures to Minimise Impact on Other Airspace Users
Section 10 - Utilisation of Airspace
Section 11 - How to Provide Feedback
Annex A - ACP-2021-12 Stage 2 Engagement Feedback Form

3 Statement of Need (SoN)

3.1 To help understand the requirement the original SoN is reproduced:

Since the SoN was written orbital rocket launch airspace requirements have been removed from this ACP.

> *"A consortium led by the local council (Comhairle nan Eilean Siar), comprising Highlands & Islands Enterprise, private investors and QinetiQ, are developing a vertical launch spaceport site, herein known as 'Spaceport 1', at Scolpaig, North Uist on the Western Isles. This site is being developed as an opportunity in support of the UK government's spaceflight programme, 'LaunchUK', which aspires to grow the UK's global market share of the space sector to 10% by 2030 and be at the forefront of small satellite launch.*
>
> *Spaceport 1 has been the recipient of local government investment to construct a vertical launch spaceport that will enable small satellite launch. Development of the site and future use by operators will generate much needed revenue for local communities. It is envisaged that significant economic return will result from the creation of high quality job opportunities for local residents, direct and indirect financial income and an increase in personnel residing and visiting the area.*

The location has been carefully selected in order to minimise disruption to the public and airspace users, the latter through the exploitation of the existing Ministry of Defence (MOD) managed Danger Areas known as the Hebrides Range; the EG D701 complex. Using irreducible spare capacity of the existing Danger Area complex will enable safe testing of suborbital 'sounding rockets' and future small satellite launch rockets[1]. The existing Danger Areas are fully integrated into systems and processes employed by the UK Airspace Management Cell (AMC) and the Eurocontrol Network Manager enabling harmonised and dynamic planning of the Air Traffic Management (ATM) network. Moreover, it is envisaged that QinetiQ will manage any 'new' airspace created under the ACP in exactly the same fashion the Hebrides Range airspace is managed, thereby utilising existing airspace management processes and procedures enabling efficient use of airspace under the Flexible Use of Airspace (FUA) concept. Furthermore, this will facilitate expedient transfer of airspace use from MOD activity to Spaceport operations as well as accommodating short notice changes and, where appropriate, coincident operations.

The Spaceport 1 site at Scolpaig currently lies beneath Class G unregulated airspace but is only a few miles from the EG D701 complex. As rocket launch will pose a risk to other airspace users, there is a requirement to safely segregate such activity to minimise risk. Segregation is normally achieved through the promulgation of temporary reserved airspace activated by a Notice to Airmen[2] (NOTAM). However as the airspace is likely to be needed on a regular basis, the promulgation of a NOTAM detailing the coordinates and control procedures for every launch is probably not appropriate as a long term solution. Furthermore, such temporary airspace is not fully integrated into the airspace management systems and has to be created on a case by case basis thereby increasing workload and by necessity, the notification periods for activation.

It is therefore considered an ACP is required to provide a small fillet of segregated airspace that provides both adequate protection for the spaceport activities and connects the spaceport with the Hebrides Range Danger Areas. It should be noted that the MOD have developed an agreed process for non-MOD activities to be conducted in MOD sponsored Danger Areas such as the Hebrides Range. This formalised process is an enabler that should allow Spaceport 1 to operate, under certain conditions, in the Hebrides Danger Areas. The small fillet of airspace required under the ACP effectively joins the most easterly boundary point of D701E with D701Y, where the latter adjoins D704.

The ACP will enable both sounding rockets to be tested (nominally on a westerly bearing) and small satellite rocket launch to the North[3]; both trajectories maximising the use of the D701 complex."

[1] The requirement for orbital launch options is no longer included in this ACP

[2] Since the SoN was produced the CAA have changed the terminology to be gender neutral and should now read: 'Notice to Aviation'

[3] Although the requirement for orbital 'launch to the North' has been removed, there remains a requirement to be able to conduct certain sub-orbital launches to the North where they can be wholly contained within D701

4 Airspace Design Principles (DPs)

4.1 Airspace Options – Relationship to Design Principles

In accordance with CAP 1616 the airspace options should be aligned with the DPs. For ACP-2021-12 the DPs were first circulated for comment in June 2021 and were later revised following engagement feedback and the CAA Define Gateway Assessment in September that year. As part of your input, please consider these DPs against the proposed airspace designs and highlight on the feedback form where you believe the airspace design option does not meet one or more of the DPs. To assist in this evaluation, the revised DPs (as published on the CAA airspace portal), are detailed below.

It should be noted that the expanded explanation of DP2 and DP3 make reference to orbital rockets, which have since been removed from this ACP. While the CAP 1616 process does not allow for subsequent modification of the DPs' descriptions, the orbital rockets element should be discounted in making your feedback. Furthermore, DP9 is no longer relevant as this relates solely to orbital rocket launch and is therefore Not Applicable (NA).

DP1	**Safety**	**The safety of all airspace users is the paramount factor in the airspace design**
Safety is the single most important factor and DP1 establishes the need to design airspace that provides adequate protection from any hazards associated with rocket launch from SP-1 to other airspace users. Note: safety of third parties on the ground or seaspace is detailed in separate but parallel work packages associated with the planning consent regulations.		
DP2	**Safety**	**The airspace design will be of the smallest volume to safely segregate Spaceport rocket launches from other airspace users thereby minimising the impact on other airspace users**
In ensuring safety of other airspace users the airspace design should consider the potential failure of the spacecraft both at the launch site, immediately after launch and when in flight. The airspace design must be of sufficient volume to contain all credible risks associated with rocket malfunction for both orbital and sub-orbital sounding rockets. The former have trajectories predominantly to the North of the launch site and despite EG D701 complex containing a significant portion of the hazard, the airspace design may need to consider airspace outside the EG D701 boundaries. This may, in the interests of minimising the volume of airspace required, call for a bespoke modular airspace design within EG D701 complex as well as beyond.		
DP3	**Operational**	**Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations**
When considering the impact on other airspace users the new airspace should not be considered in isolation but must also take into account the consequential impact of activating numerous EG D701 areas for SP-1 operations (if this is deemed appropriate) at times when the Danger Areas may not normally be activated. This design principle includes consideration of which EG D701 areas need to be activated and their impact on other stakeholders in particular where these necessitate the closure of Oceanic Entry Points (OEPs) for the North Atlantic (NAT) tracks. It may prove beneficial to utilise		

D701 for sub-orbital sounding rocket activities where these can be contained wholly within the D701 complex. This DP may not be relevant if a bespoke modular design is preferred for orbital launches.		
DP4	**Operational**	**Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex**
This design principles should include integration of the new airspace into the ASM processes of the existing EG D701 complex thereby minimising the need for new multifaceted standalone procedures and exploiting current Standard Operating Procedures (SOPs). This will enable timely notification of operations and swift cancellation of NOTAMs thereby freeing up airspace efficiently. Furthermore, expanding extant EG D701 procedures to include the new SP-1 airspace (both around the launch site, beyond D701 boundary or, for a bespoke solution), will enable safe access for other airspace users when deemed necessary, in particular emergency services.		
DP5	**Operational**	**Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design**
It is recognised that use of the EG D701 areas will be subject to MOD activities and priorities therefore an important design principle will be the operational integration of SP-1 activities in and around MOD use. By managing both programmes, QinetiQ expects to be able to facilitate the most efficient use of airspace especially where it is proven safe to conduct simultaneous operations.		
DP6	**Operational**	**The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy**
It is recognised that any new Danger Area airspace will have to comply with the CAA Buffer policy and ANSPs may be required to apply FBZs. The design principles will have to take into consideration both these requirements. Furthermore, the advent of FRA in the Scottish Flight Information Region (FIR) will need to be considered.		
DP7	**Environmental**	**The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the airspace in addition to considering the noise, emissions and light pollution in the local area**
It is likely that the new airspace around the launch site and beyond the boundaries of EG D701 will be relatively small in volume (due to rocket launch profiles), and therefore current traffic patterns should be unaffected. However, a holistic approach is required to consider the wider impact that subsequent activation of the EG D701 Danger Areas, (and any additional airspace requirements beyond EG D701, including a bespoke modular design) will have, in particular on the NAT tracks. Any deviation caused by unavailability of OEPs will have to be carefully considered in the airspace design to understand the environmental impact of additional miles flown by aircraft forced to deviate from route. It is further acknowledged that rocket launch from the site at Scolpaig will create noise and light pollution; and these elements will need to be considered in the airspace design especially where they are traded off against minimising disruption to Commercial Air Transport (CAT). Many of these environmental issues are being considered within the planning application and associated Environmental Impact Assessment (EIA); the latter will help inform part of the ACP process.		

DP8	**Regulatory**	**The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018**
It is recognised that the airspace design might be influenced by the secondary legislation to the Space Industry Act (SIA) 2018. The design principles will take account for any additional legislative requirements, in particular where these are linked to the Spaceport operator licence and Range operator licence.		
DP9	**Operational**	**Rocket stage drop zones may be required outside the EG D701 Areas and will need to be considered**
For orbital rocket launch, it is expected that one or more rocket stages may be required that will separate after launch. Where separation and return to earth occurs outside the EG D701 complex, additional segregated airspace will be required – The design principle should include the most efficient use of airspace to accommodate this requirement.		

5 Local and Adjacent Airspace Overview

5.1 Local Airspace

The SP-1 launch site at Scolpaig, North Uist, lies beneath Class G airspace and has Benbecula Airport approximately 10NM to the south, the small beach landing strip at Sollas approximately 5.5NM to the east and Stornoway Airport approximately 58NM to the north east. The launch site is located between the MoD Hebrides Range Danger Areas EG D701 and EG D704 (see *Figure 1*). There is limited General Aviation (GA) activity in the local area with this mainly concentrated during the Sollas annual fly-in event during the summer. Other aviation activity is minimal, comprising prominently of scheduled flights to/from Benbecula (circa 6 flights per day during the busier summer months), occasional helicopter activity, and coastguard, medical and lighthouse support aircraft as well as military aircraft either conducting trials on the Hebrides Range or training in the local area (these flights increase significantly during the bi-annual exercise Joint Warrior).

Information gained during the TDA (ACP-2021-37) engagement process has indicated that the proposed segregated airspace around the SP-1 site will not impact on flights operating to/from Benbecula, Barra or Stornoway Airports.

The airspace to be utilised under this ACP is largely over the ocean with very few land areas other than in the immediate vicinity of the launch site and a number of small generally uninhabited islands.

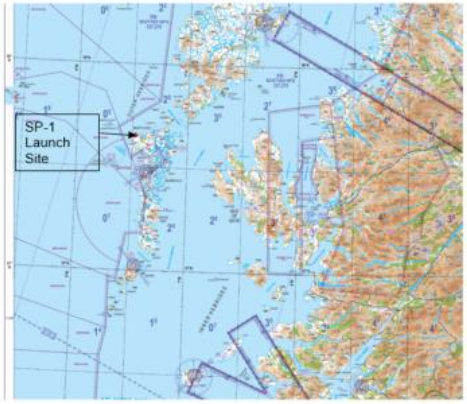


Figure 1: Local area airspace in the vicinity of SP-1 site

5.2 Affected Adjacent Airspace

Considering the airspace further afield, it can be seen that this ACP will mostly affect CAT routing on the NAT oceanic tracks through the OEPs at 10° west and potentially, MOD activity. There are also a number of other military sponsored Danger Areas over the North of Scotland that if active at the same time as SP-1 could have a blocking effect on CAT over Scotland. This is potentially further exacerbated by the development of other vertical launch Spaceport sites at Sutherland and Shetland (see *Figure 2*). These issues will need to be addressed later in the ACP process.

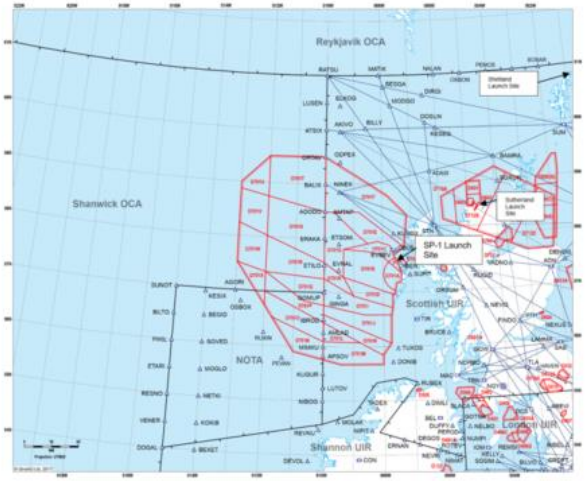


Figure 2: Adjacent airspace in relation to SP-1 launch site including other planned vertical launch spaceports

6 Design Options - Considerations

6.1 Introduction

QinetiQ, in developing the temporary airspace for SP-1 (ACP-2021-37), gained a significant amount of important information on the concerns of local airspace users, Air Navigation Service Providers (ANSPs) and the Ministry of Defence (MOD). This information has informed the airspace options process and will be used in the options appraisal during Step 2B of Stage 2.

6.2 Important Background Information

6.2.1 **Airspace Change – Vertical Launch Spaceport Differences**

Unlike 'normal' airspace changes associated with accommodating aircraft with established safety pedigree and the ability to easily manoeuvre, where it is possible to modify flight profiles (and thus airspace design) to meet stakeholders' needs; the airspace change process is not as straightforward in the case for vertical launch spaceports. Here the options for airspace design are limited as they are driven by the required trajectory of the rocket system (with limited pedigree) and the associated safety trace[4] that determines the boundary of the airspace either side of the trajectory track. This boundary has to be sufficient distance from trajectory track to ensure all credible hazards associated with a malfunction or catastrophic failure of the rocket are contained therein. The safety trace around the trajectory track encompasses the worst case scenario events that could occur on the launch pad, in the minutes after launch and at any time during the rocket flight until it no longer poses a threat/hazard (i.e. once it splashes down in the ocean). The safety trace and debris field (following explosion) generally 'fans out' from the launch site as the vehicle increases velocity and gains altitude, thereby increasing the size of any debris field following failure. Therefore, catastrophic failure on the launch pad or immediately[5] after launch, means the debris field is contained in a relatively small area; it is only once the vehicle is climbing and rapidly accelerating that the hazard area and debris field increases and more airspace is needed. This expansion of hazardous area/debris field continues to fan out until it reaches a point where it will not have any further increase in the lateral plane, only in the direction of travel along the line of trajectory post failure until 'splash down'. For these reasons the airspace design options show a comparatively small safety trace area around the launch site, thereafter fanning out until splash down.

6.2.2 Spaceport Airspace Challenges

A further challenge to the airspace design is the fact each different rocket type will have a different safety trace. Furthermore, not only does the safety trace change between different rocket types but also between the same rockets where the payloads are of different mass. Where the acceleration of the rocket is reduced due to high mass payload, this results in the rocket travelling a greater distance along the trajectory track before splashing down. This information is only fully understood during the planning stage for each individual launch where the safety traces are calculated along with the corresponding airspace requirements. Only when the airspace requirements are known can the airspace design be developed. This means it is extremely difficult to predict at this juncture what the exact airspace dimensions are likely to be for each launch other than in the immediate vicinity of the launch site (paragraph 7.2 refers). To address this, the Sponsor proposes a modular block design extending from the launch site that can accommodate a number of trajectories[6] and worst case scenarios; different blocks of airspace can then be activated to meet the safety trace of the rocket being launched once these are known. Furthermore, this method enables the launch of rockets with limited pedigree to be safely operated.

[4] Safety trace is the term given to the volume of airspace needed to contain all credible hazards, including the debris field created by any failure or subsequent destruction of the rocket that may pose a risk to third parties. This includes the failure of any of the vehicles' systems or components, as well as catastrophic system failure planned (in the case of a flight termination system) or unplanned.

[5] Within a few seconds after launch.

[6] Different trajectories are necessary to meet varying characteristics of different rocket types and may be influenced by environmental and other airspace considerations.

This challenge is no different to the testing of MOD systems on the MOD Hebrides Range. This is why the D701 Danger Area complex is made up of a number of different airspace blocks (26) that extend out from the Range Head incrementally. When a system is going to be tested on the Range all the relevant data is examined and the appropriate safety trace designed for that system. The safety trace is then overlaid onto the D701 areas to determine what areas need to be activated in order to wholly contain the hazard. The trajectory or firing line can often be adjusted to minimise the number of D701 areas needed. The Sponsor is proposing exactly the same methodology is used for sub-orbital rocket launch by either utilising the existing D701 complex or designing a new bespoke airspace structure originating at the SP-1 site.

6.2.1 Other Considerations

It was identified during Stage 1 of this ACP, and during the TDA engagement process, that the airspace design options will need to consider the most efficient use of airspace. Where existing airspace structures are contemplated for ease of use, flexibility to operators and utilisation of tried and tested processes and procedures, these considerations need to be carefully balanced against the cost and impact on other stakeholders. This will form part of the engagement process during this step and will be a critical element of Step 2B, 'options appraisal'.

The impact that closing large areas of oceanic airspace has on the ATM network is well documented and understood by the Sponsor. Careful consideration of how to minimise the impact remains a key element in the airspace design and subsequent operating procedures. Furthermore, it is recognised that any such closures should not be measured in isolation and the cumulative effect of segregated activities across the UK FIR will need to be reflected through the development of agreed airspace protocols between all main parties (MOD, Spaceport operators, ANSPs, aviation stakeholders and Regulator).

The Sponsor is cognisant that FBZs will be required around those areas of new segregated airspace that are developed and these FBZs may differ in size depending upon the location of the segregated airspace. Furthermore, it is understood that additional airspace reporting points might need to be established to enable General Air Traffic (GAT) to safely route around the segregated airspace when active. These aspects will be explored during this engagement period.

7 Airspace Options

7.1 Airspace Around Launch Site – Background

With the need to segregate the airspace around the launch site, QinetiQ staff undertook safety analysis work to determine if a straight line drawn between two exiting Aeronautical Data Quality (ADQ) points, connecting D701F and D704 (see *Figure 3*), would contain all credible hazards associated with rocket launch. It was determined that this area, herein referred to as the 'fillet', was more than adequate to contain the hazards. Moreover, by using two existing ADQ points this would simplify the airspace

change process and be easier to understand in particular for the TDA that was needed ahead[7] of the permanent airspace solution.

Figure 3: Diagram depicting the original proposed airspace 'Fillet' design over SP-1 launch site

However, it was documented during the TDA proposal development that this design had the potential to impact on the beach landing strip at Sollas. Following the concerns of Sollas stakeholders and subsequent delay of the TDA, further in depth safety analysis was conducted the results of which demonstrated the eastern boundary of the fillet of airspace could be safely re-profiled so as not to affect the landing site at Sollas. The original airspace fillet design is therefore discounted as an option. The new proposed design is shown at *Figure 4*.

[7] At the time the TDA had a compressed timeline and this 'more than safe' option was considered appropriate given the very limited time available to conduct additional safety analysis.

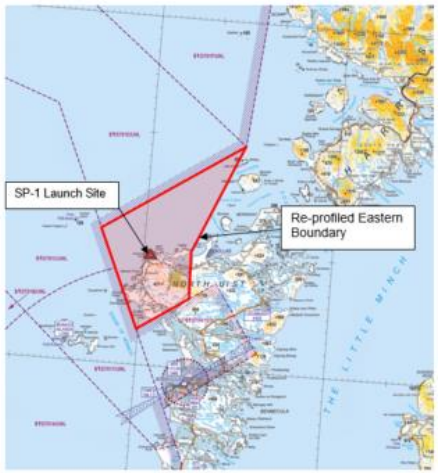


Figure 4: New proposed small 'Fillet' of segregated airspace around the SP-1 launch site

7.2 Safety Analysis

Due to the lack of pedigree of sub-orbital rockets, QinetiQ Range and safety staff have conducted a generic safety analysis approach using key US military and Federal Aviation Authority (FAA) reference documentation as well as experience gained from launching ballistic missile target rockets from the Hebrides Range since 2015. The analysis, conducted through a risk management process, includes but is not limited to: launch risk analysis and hazard identification, risk criteria, probability of failure, hazard thresholds, casualty areas, debris risk assessment, vehicle and debris dispersion modelling, risk uncertainties and assessment of other related risks. The outcome of the analysis provides evidence to the CAA that the boundaries of the proposed segregated airspace fillet at *Figure 4* present the maximum reasonable geographic extent of the region within which credible hazards could occur due to rocket launch and flight activities. It should be noted that the ground safety footprint may preclude rockets being launched in certain wind conditions where this causes debris to fall over the land areas.

It was further identified, from experience gained launching ballistic missile targets from the MOD Hebrides Range during the Formidable Shield (FS) Exercises that there is likely to be a requirement to

safeguard personnel (working at the launch site) from the hazard created by low flying aircraft. It is determined that these spaceport personnel may be at risk of harm while engaged in pre-launch preparation such as refuelling and arming phases of the rockets, if they are suddenly alarmed by the appearance and noise from a low flying aircraft; in particular fast jets. Because these refuelling/arming activities may occur several hours or even days before the intended rocket launch, it was determined, in the interests of Flexible Use of Airspace (FUA) that it would be inappropriate to have the whole segregated airspace fillet activated for the purpose of protecting ground personnel. It is proposed that a small inner circular area around the launch pad, as depicted in *Figure 5*, is made available. This can activated for longer periods of time without adversely impacting on other aviation stakeholders. This additional volume of airspace extends 1000m laterally from the launch pad, extending to 3000ft above ground level (AGL) and sits within the larger airspace fillet. The primary use of this small area of segregated airspace is to protect SP-1 personnel on the ground from the sudden appearance and noise from a low flying aircraft. It may further be of use (should it be deemed necessary by the rocket providers) to provide the rocket systems with Radio Frequency (RF) interference protection from low flying aircraft during the same critical stages of preparation.

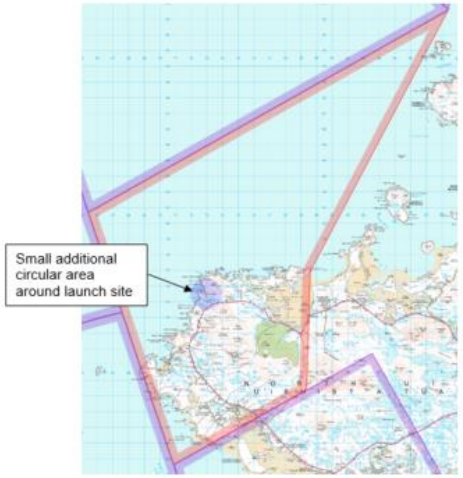


Figure 5: Proposed airspace 'Fillet' with additional circular segregated airspace area around launch site

7.3 Airspace Options for Sub-orbital

7.3.1 Option 0 - Do Nothing

This option leaves the airspace as it currently exists (depicted in *Figure 1* and *Figure 2* above). Although utilisation of D701 Danger Area could provide segregation for a portion of the rocket trajectory (where this is permitted), the area around the launch site would remain unsegregated. Without segregation, it is considered that rocket launch could not occur due to the risk to other airspace as rockets will have no means of complying with the Rules of The Air (RoTA). This option is therefore considered unviable.

7.3.2 Option 1 – Do Minimum

This option would necessitate bespoke airspace designs for each individual launch following the safety assessment and safety trace analysis. NOTAMs and associated Aeronautical Information Publication (AIP) Supplement (SUPP) information would have to be created and published for each launch to enable segregation. Such one-off NOTAMs would not be fully integrated into the UK AMC or Eurocontrol Network Manager (NM) ASM systems that enable the harmonised and dynamic planning of the ATM network. An exemplar NOTAM is depicted at *Figure 6*.

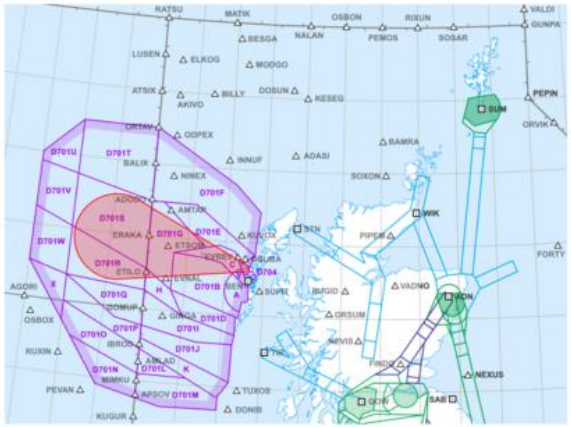


Figure 6: Option 1 - Do Minimum: Diagram showing an exemplar NOTAM area for single rocket launch

7.3.3 Option 2 – Do Minimum and Utilise D701

This option would still necessitate an individual NOTAM and associated AIP SUPP information prescribed for the fillet of airspace around the launch site for each individual launch. Such one off NOTAMs would not be fully integrated into the UK AMC or Eurocontrol NM ASM systems that enable the harmonised and dynamic planning of the ATM network. The D701 areas could be activated in the normal manner using only those areas necessary to contain the safety trace of the rocket being launched. An example of the areas required for a sub-orbital rocket launch similar to that shown in Option 1 is depicted below in *Figure 7*

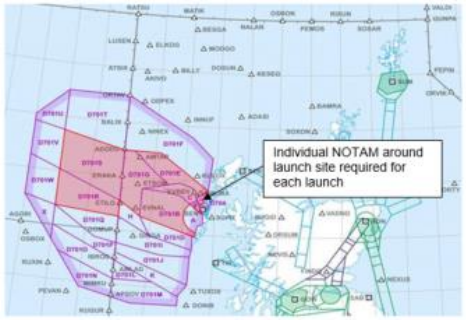


Figure 7: Option 2 - Do Minimum & Utilise D701: Diagram showing an example of D701 areas activated

7.3.4 Option 3 – New Fillet of Segregated Airspace around Launch Site and Utilise D701

This option includes the use of a new fillet of airspace around the launch site between D701 and D704 that could be activated by NOTAM in the same manner as D701. This would provide a permanent airspace solution over the launch site and provide connectivity to the D701 Danger Areas. The D701 areas could be activated in the normal manner using only those areas necessary to contain the safety trace of the rocket being launched. Both the fillet of airspace and D701 would be fully integrated into the systems and processes employed by the UK AMC and the Eurocontrol NM, enabling the harmonised and dynamic planning of the ATM network. Furthermore, this option provides the most straightforward operation for Range staff as each different sounding rocket launch would be treated in exactly the same manner as any MOD weapon firing or test and evaluation event. The new fillet of airspace would be treated as an extension of D701 for ASM purposes and the associated D701 areas would be activated accordingly to meet the safety trace requirements of the vehicle being launched. Notification, activation and deactivation would follow existing procedures and Letters of Agreement (LoAs).

7.3.5 Option 4 - Construct New Bespoke Segregated Airspace Blocks From Launch Site

As many of the sounding rockets have very limited pedigree, endeavouring to accurately predict the launch profiles, and critically the safety traces, is not feasible at this stage (so far in advance of the launch). Therefore, any attempt to design new airspace blocks introduces risk unless a large bespoke modular design is used. Any such large bespoke modular design for sounding rockets would have to extend in excess of 250km west north-west from the launch site and be constructed of several different airspace blocks to enable a process of tailored activation (similar to that currently used for D701) to be adopted. With experience gained from the ACP pertaining to the redesign of the D701 areas in 2014, it is expected any such modular design would have to be largely aligned to the existing boundaries of D701 to enable minimum disruption to traffic routing to/from the OEPs at 10° west. The modular design and alignment of the D701 Danger Areas may not always occupy the absolute minimum volume of airspace (with more airspace sometimes being activated than is absolutely necessary) however its alignment enables CAT to fly the shortest routes to/from the OEPs. Therefore, any additional unused airspace becomes largely irrelevant especially as this airspace is rarely used by anything other than CAT. For this reason, it is considered that any modular bespoke design would have to follow similar alignments to that of D701. The airspace would be fully integrated the systems and processes employed by the UK AMC and the Eurocontrol NM enabling the harmonised and dynamic planning of the ATM network.

The new airspace blocks would overlay a significant part of the existing D701 areas (see *Figure 8*) and would require careful delineation to prevent confusion; this would be particularly important when simultaneous activities were occurring (MOD use of D701 and SP-1 use of new areas). New ASM process and procedures would be required for this option.

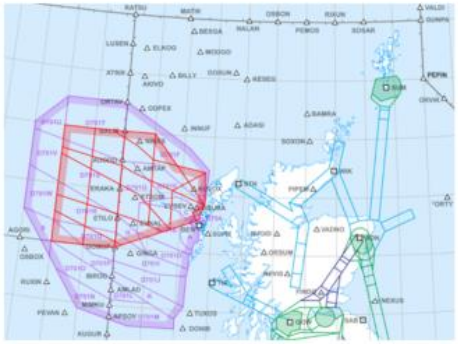


Figure 8: Option 4 – Example of what a new bespoke airspace design might look like

7.3.6 Option 5 – Use in Conjunction With Option 2 or 3 Adding Sub-division of D701B, C, D, E, & F

This option introduces a series of sub-divisions of the existing D701 areas in order to reduce the overall volume of airspace unavailable to other airspace users. The exact positions of these sub-divisions would require further work to conclude the optimum location; however, an example of what this might look like is depicted at *Figure 9*.

Whether the additional airspace made available by this option would be of benefit to other airspace users will form part of the analysis in Stage 2B of this ACP. This option would need MOD support and agreement, and further investigation to establish if any changes to the D701 construct would be permitted as part of the present ACP. If this is not the case and an additional ACP is required to modify D701, then the cost benefit analysis of this option would have to be carefully considered during Step 2B of Stage 2 to ensure the airspace gains[8] were cost-effective against any additional ACP costs, especially when balanced against the limited usage (probably only once or twice a month).

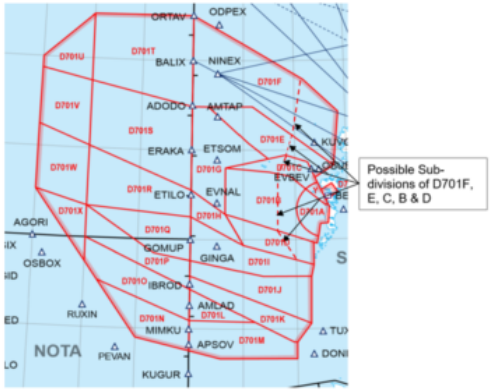


Figure 9: Option 5 – Exemplar sub-divisions of D701

Note: Options 3 to 5 include the small additional circular area of airspace around the launch site as described in paragraph 7.2

[8] The use of any additional airspace availed through these sub-divisions is likely to be limited to GAT and might not provide sufficient benefit to be cost effective.

7.4 Options Summary

The following table provides a summary of proposed options:

Option	Description	Notes
0 - Do nothing	No change to current airspace	Not viable for rocket launch.
1 - Do Minimum	Design and publish unique airspace design NOTAM & AIP SUPP information for every individual launch	Temporary NOTAMs not integrated into ASM systems.
2 - Do Minimum & Utilise D701	Design and publish unique airspace design NOTAM & AIP SUPP information for airspace around launch site.	Temporary NOTAMs not integrated into ASM systems.
3 - New Fillet of Segregated Airspace around Launch Site and Utilise D701	New Fillet would be an extension of D701 and activated in a similar fashion	Fully integrated into ASM systems; Utilise existing ASM processes and procedures.
4 - Construct New Bespoke Segregated Airspace Blocks From Launch Site	Design a new bespoke airspace complex from the launch site extending out over D701	Require new ASM processes and procedures; Area delineation may be an issue.
5 – Adding Sub-division of D701B, C, D, E, & F	Use in Conjunction With Either Options 2 & 3 – Sub-divisions reduce the overall airspace volume in use within D701	May need additional ACP to make changes to D701; Additional airspace made available would have limited use.

Table 1: Summary of airspace options

8 Airspace Classification Options

8.1 Types of Airspace to Accommodate Vertical Spaceport Launches

Rocket launches and flights pose a risk to other aviation users either through mid-air collision or, following catastrophic failure of the rocket (explosion), debris impacting other aircraft. To safeguard airspace users from these risks there is a requirement to segregate the activity accordingly. This is achieved through establishing segregated airspace in one form or other.

The SP-1 launch site at Scolpaig on North Uist currently sits beneath Class G 'uncontrolled' airspace. This means anyone is entitled to operate in this airspace without any specific equipment, training or air traffic control. Therefore, there is no method to safeguard them from SP-1 rocket launches. In the UK there are five classifications of airspace which can all provide a method of segregation. These are detailed and assessed for suitability by the Sponsor in the table below.

8.2 Classification of Airspace Comparison A, C, D, E & G

Type of segregated airspace	Suitability for Rocket Launch	Sponsor Comment
Class A	No	- IFR flight is mandatory in class A airspace, rockets will be largely 'uncontrolled' after launch so will be unable to comply with ATC instructions applicable in Class A or comply with RoTA - Rockets will not be equipped with the necessary CNS equipment for flights in controlled airspace - Controlled airspace is currently permanently on/active, therefore in the spirit of FUA it is not practicable to have Class A for the relatively few launches - Too restrictive on other airspace users (inability to access Class due to aircraft equipment and pilot limitations)
Class C	No	- ATC instructions mandatory in class C airspace, rockets will be largely 'uncontrolled' after launch so will be unable to comply with ATC instructions applicable in Class C or comply with RoTA - Rockets will not be equipped with the necessary CNS equipment for flights in controlled airspace - Controlled airspace is currently permanently on/active, therefore in the spirit of FUA it is not practicable to have Class A for the relatively few launches - Too restrictive on other airspace users (inability to access Class due to aircraft equipment and pilot limitations)
Class D	No	- Rockets unable to comply with ATC instructions that are mandatory in class D airspace or comply with RoTA - Inability to operate under either IFR or VFR as rockets will be largely 'uncontrolled' after launch - Controlled airspace is currently permanently on/active, therefore in the spirit of FUA it is not practicable to have Class D for the relatively few launches
Class E	No	- Rockets cannot comply with IFR or VFR, or RoTA - Controlled airspace is currently permanently on/active, therefore in the spirit of FUA it is not practicable to have Class E for the relatively few launches
Class G Danger Area	Yes	- Less impact on other airspace users since it can be tactically managed (does not have notified hours of activation in UK AIP) – only activated by NOTAM when needed

Type of segregated airspace	Suitability for Rocket Launch	Sponsor Comment
TMZ/RMZ	No	- Rockets may not be transponder equipped - Airspace would need to be controlled by approved ATC not Range controllers – resourcing issue - TMZ/RMZ would preclude many of the aircraft using the beach landing site at Sollas during periods when the Spaceport is not active

Table 2: Proposed Airspace Types for Consideration with Sponsor Comment

9 Measures to Minimise Impact on Other Airspace Users

9.1 Classification of Airspace

Airspace with the least restrictions to other airspace users is uncontrolled Class G. This airspace still has the option to 'segregate' activity through the establishment of a Danger Area; such Danger Areas can be activated by NOTAM when needed. The Sponsor therefore proposes that the airspace classification around the launch site remains Class G.

9.2 Activation Procedures and Access to Active Danger Area

MOD Hebrides Range will manage the fillet of airspace in the vicinity of the launch site in exactly the same way as the airspace within D701 is managed when active. In essence, the new fillet of segregated airspace (and additional small circular area around the launch site) being proposed, will be treated as an extension of the D701 complex. Here MOD Hebrides Range have developed robust procedures to enable Search and Rescue (SAR) aircraft, Air Ambulance, Coastguard and other emergency services aircraft access when safe to do so. As MOD Hebrides Range manage the activity in D701, they can manage rocket launch from D701 such that the launch can be delayed in an emergency or where national security must take priority. MOD Hebrides Range will also work with local airspace users to enable admittance into the new fillet of airspace when it is safe to do so. As the airspace is likely to be activated for a period before launch, MOD Hebrides Range control staff will advise airspace users when it is safe to cross prior to and immediately after launch. For radio equipped aircraft it is anticipated that the fillet of airspace will only prohibit access for a short period, probably less than an hour prior to launch to a few minutes after launch.

For a bespoke airspace solution for each launch (Option 2) that is independent to D701 (where this is the preferred option), access to this airspace may take longer to arrange given the volume of airspace being NOTAMed; however, like the small fillet of airspace around the launch site, the airspace will be released (NOTAM cancelled) almost immediately after launch as it is anticipated the rocket will only be utilising the airspace for a matter of minutes – this will only change should the rocket have a catastrophic failure or need to be destroyed, then there will be a more protracted period for the airspace to be active to enable the debris field to clear. This will be evaluated for each launch and shared with airspace managers and ANSPs in advance.

10 Utilisation of Airspace

10.1 Anticipated Rocket Launch Schedule

It is currently not possible to predict the actual usage of the SP-1 facility for sub-orbital rocket launches; however, under the conditions of the proposed planning application, the number of launches will be limited to 10 per year. It is expected that some months may have two or three launches and other months, particularly in the winter, will see only a single or no launch.

It is anticipated that the small Danger Area (1000m radius surface to 3000ft agl) will be needed on one or two occasions per launch up to 3 weeks in advance of any proposed launch window and for periods of several hours for 'wet rehearsal' days. The main fillet of segregated airspace will be required for a period of approximately 2-3 hours for each launch (this is necessary to enable sufficient time to clear the 'sea-space' prior to any launch). It is probable that one or two spare days will be required for each launch to mitigate against technical, weather or Foul Range[9] issues. Where practicable, a decision whether to activate the airspace will be made the day before at D minus 1 (D-1). This way the airspace can be fully utilised in the event of launch cancellation. Worst case scenario is the rocket launch is cancelled on the day in which case the NOTAM might already be active and airspace restrictions in place; this could occur on the spare days as well. In order to minimise the impact on the ATM network, SP-1 will consider developing protocols that could include a day break between preferred launch day and any spare days to enable the ATM network to recover and reset.

Other such initiatives and protocols will also be developed, such as launch timings to help minimise the impact on the ATM network.

11 How to Provide Feedback

QinetiQ welcomes comments and feedback from all interested parties. All comments received regarding this proposal will be taken into consideration before taking our designs through to CAP1616 Stage 2 Step 2B Options Appraisal. All the details of this airspace change proposal are available on the CAA's Airspace Change Portal. The ACP identification number is ACP-2021-12. Feedback on the proposed change and what is important to you should be sent by email to the airspace change manager at: SP1ACP@QinetiQ.com.

To assist in formulating feedback, a feedback form is provided at the Annex to this letter. If you believe any additional stakeholders should be included, please inform the airspace change manager accordingly.

You are politely requested to provide any response regarding the airspace design options no later than Wednesday 09th November 2022.

[9] Foul Range may be caused by non-participants entering the Range safety trace area; this could include personnel or vehicles on the land area, sea-space or airspace.

12 Distribution:

2Excel Aviation
Babcock Aviation
Bristow Helicopters
CnES Planning
Comhairle nan Eilean Siar
Fisheries Management Scotland
Gamma Aviation
HIAL
Highlands & Islands Strut of LAA
Historic Environment Scotland
IAA
LAA
Loganair
Marine Scotland Compliance (local fisheries office)
Marine Scotland MSLOT
MCA
Met Office
MOD DAAM (for MOD DE&S)
MOD DAATM
NATMAC
NATS
NLB
North Uist Community Council
Outer Hebrides IFG
Programme Manager General Aviation Alliance
Reykjavik Area Control Centre
RSPB Scotland
RYA
SATCO Benbecula (and Barra)
SATCO Stornoway
Scottish Creel Fishermen's Federation
Scottish Fishermen's Federation
Scottish Water
SEPA
Sollas Fly-in Coordinator
UK AMC
UK Chamber of Shipping
UK Search and Rescue
UKHO
Western Isles Fishermen's Association

13 Glossary

Acronym	Meaning
ACP	Airspace Change Proposal
AIP	Aeronautical Information Publication
AMC	Airspace Management Cell
ANSP	Air Navigation Service Provider
ASM	Airspace Management
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
DA	Danger Area
DAATM	Defence Airspace & Airspace Traffic Management
DP	Design Principle
EG D	UK Segregated Airspace Designator and Danger Area
EIA	Environmental Impact Assessment
FBZ	Flight planning Buffer Zone
FIR	Flight Information Region
FRA	Free Route Airspace
FUA	Flexible Use of Airspace
GAT	General Air Traffic
HIAL	Highlands & Islands Airports Ltd
HIE	Highlands & Islands Enterprises
IAA	Irish Aviation Authority
ICAO	International Civil Aviation Organisation
LoA	Letter of Agreement
MCA	Maritime Coastguard Agency
MOD	Ministry of Defence
NA	Not Applicable
NAT	North Atlantic
NATMAC	National Air Traffic Management Advisory Committee
NLB	Northern Lighthouse Board
NOTAM	Notice To Aviation
OEPs	Oceanic Entry Points
RoTA	Rules of The Air
SAR	Search And Rescue
SIA	Space Industry Act
SOPs	Standard Operating Procedures
SP-1	Spaceport 1
SUPP	Supplement
UKHO	United Kingdom Hydrographic Office
US	United States

A Stakeholder Feedback Form – ACP-2021-12

A.1 **Do you assess that the presented design options achieve the Design Principles (DPs); please complete the Proforma below accordingly and consider if they are 'Met', 'Partially Met' or 'Not met' in your opinion. Add your rationale in free text as appropriate.**

Name:
Representing:
Address:

	Design Principle	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
1	The safety of all airspace users is the paramount factor in the airspace design						
2	The airspace design will be of the smallest volume to safely segregate Spaceport activities from other airspace users thereby minimising the impact on other airspace users						
3	Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations						
4	Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex						
5	Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design						
6	The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy						

	Design Principle	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
7	The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the Danger Areas due to SP-1 activities						
8	The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018						
9	Rocket stage drop zones may be required outside EG D701 and will need to be considered	NA	NA	NA	NA	NA	NA

Which design option do you believe best delivers the DPs?

A.2 Feedback on preferred type(s) of segregated airspace to be implemented (including order of preference and rationale, if appropriate).

A.3 Would this proposal impact you (or members of your organisation) and, if so, are there any changes you would like to put forward for consideration?

A.4 What is your biggest concern regarding this airspace change?

A.5 Do you have any other feedback for the Sponsor?

ACP-2021-12 Stage 2A - SP-1 Airspace Design Options - Discussion Points from Meeting held between SP-1 and NATS held at NATS Brettenham House on 18 Oct 22

In Attendance:

[redacted] – QQ ACP Sponsor
[redacted]) – SP-1 Operations Director
[redacted] NATS
[redacted]) – NATS
[redacted] – NATS
[redacted] NATS

Introductions were made, [redacted] explained that the aim of the meeting was to present the rationale for the airspace options contained in the formal engagement letter and gain any early feedback from NATS. The decision to de-scope the ACP from that originally intended in the SoN was highlighted with the removal of the orbital launch airspace options and how this would significantly decrease the airspace requirements. It was acknowledged that should orbital become a future option this would be subject to an additional ACP and planning consent.

[redacted] stated that the SP-1 consortium consisted of the Local Council (lead), QinetiQ, Highlands and Islands Enterprises (HIE) and Commercial Space Technologies (CST). It was expected SP-1 would become a Ltd company at some stage in the future.

[redacted] confirmed SP-1 would be able to support more than one campaign simultaneously but with only a single launch pad facility actual launches were likely to be a week or more apart. It was further confirmed that there was no intention to conduct overnight launches.

[redacted] delivered a presentation describing the five airspace options.

Main discussion points:

- NATS suggested the Sponsor may need to consider a Flight Restriction Zone (FRZ) to counter possible drone intrusion.
- It was agreed that the small additional circular segregated airspace around the launch site to protect SP-1 ground personnel was a valid proposal.
- NATS highlighted the requirement for SP-1 to formally request AMC involvement for the airspace to become AMC manageable.
- NATS suggested that the SIA 2018 required affected ANSPs to be a signatory on any future airspace management agreements; it is considered that this may be in the form of LoAs but there is no current guidance regarding what constitutes 'sign off'.
- NATS stated that SP-1 launches were not state sponsored therefore could not be classified as MOD activity.
- NATS would like to see the term 'irreducible spare capacity' removed from the ACP correspondence as they did not consider the airspace as having irreducible space capacity.

[redacted] explained that this statement was with reference to spare Range capacity not specifically airspace however; to avoid any misinterpretation it was agreed this would not be included in future correspondence (it is noted that this cannot be removed from the original statement of need).

- NATS suggested that delays to CAT attributable to SP-1 launches would have to be treated separately to those attributable to MOD activity unless operating in support of MOD.
- NATS highlighted that the number of actual launches (10) was not the main issue, it was the number of minutes a volume of airspace was unavailable that counted; this should include contingency days. Therefore, duration of the launch windows would be critical as well as frequency of airspace activation, especially where launches were cancelled at late notice (with insufficient time to hand the airspace back). All had to be factored in when considering the impact on the ATM network.
- NATS explained how the Oceanic routing will change at some stage in the future with the introduction of FR airspace where airlines can plan point to point. It was recognised that OEPs currently remained an import point to consider, especially with any potential sub-divisions to the existing Danger Area (D701) airspace structure. It was further noted that separation criteria might also be reduced against airspace reservations in Oceanic airspace at some stage (this was the subject of ongoing work within ICAO).
- NATS suggested that any sub-divisions of D701 should be analysed to identify the benefits and the number of OEPs affected should also be considered as well as time of day.
- MR explained that there were no current plans for orbital launches from SP-1.

The meeting was concluded and PB thanked all for their participation.

Draft record of discussions produced by [redacted] QinetiQ

18 Oct 22

[redacted]

Wed 12/10/2022 15:42

[redacted]

RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

To SP1 ACP

From: [redacted]cne-siar.gov.uk>
Sent: 11 October 2022 12:40
To: [redacted]
Cc: [redacted]
Subject: FW: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

Dear [redacted]

On behalf of the Planning Service of Comhairle nan Eilean Siar, I acknowledge receipt of the below and attached request for engagement.

Comhairle nan Eilean Siar, in its capacity as Planning Authority, is currently in the process of assessing an EIA Planning Application for the SP1 development. This process involves hosting the relevant planning and environmental documents on planning online and inviting public comment on same.

I write to enquire if the Airspace Options Engagement proposal involves a similar public consultation process.

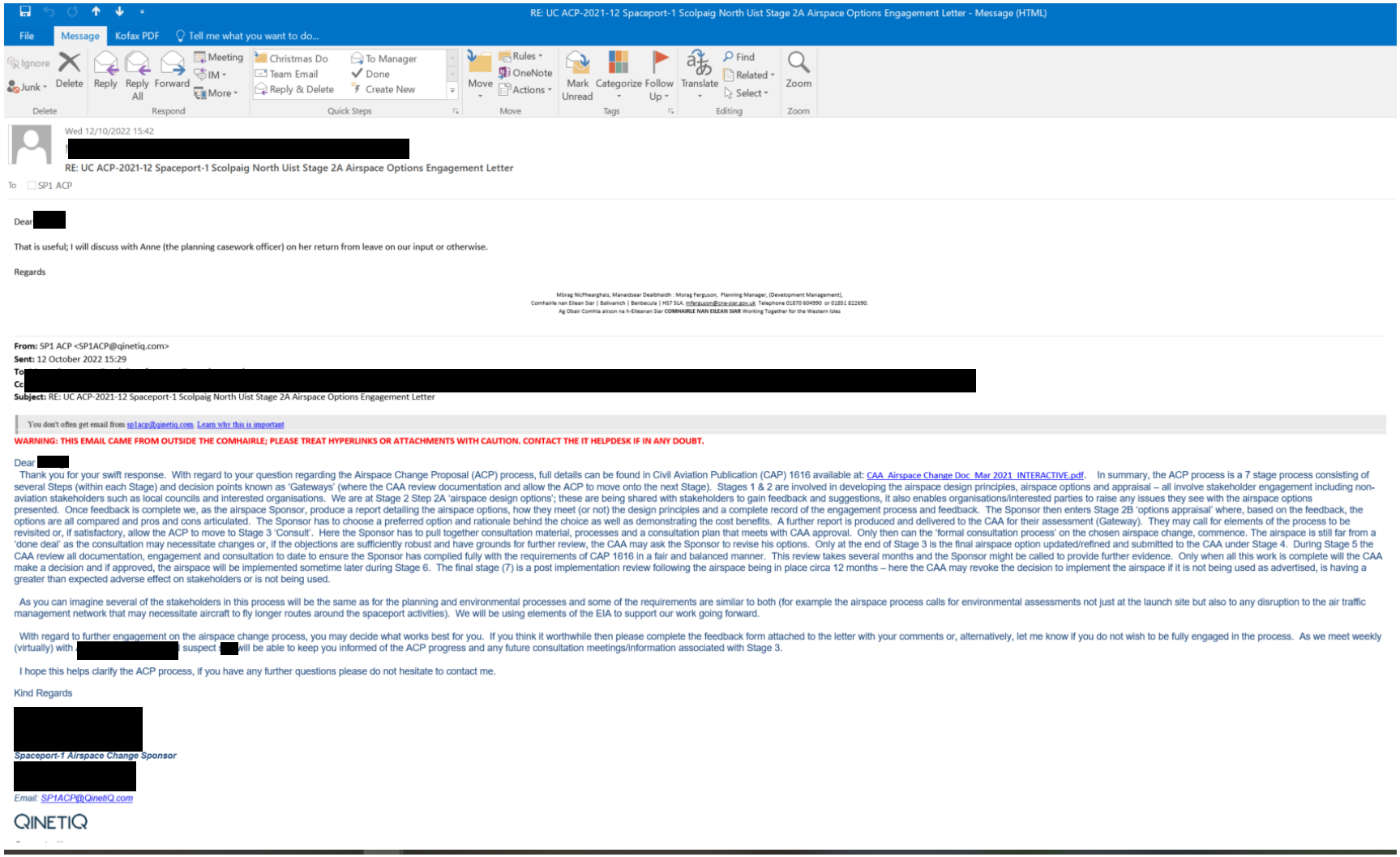
As Comhairle nan Eilean Siar has a role as owner of the SP1 site, is a partner in the consortium and is also the Planning Authority, as a Planning service we require to be open and transparent in all our communications re SP1. We wish to ensure that we handle this consultation in a way that we are not found failing in that regard.

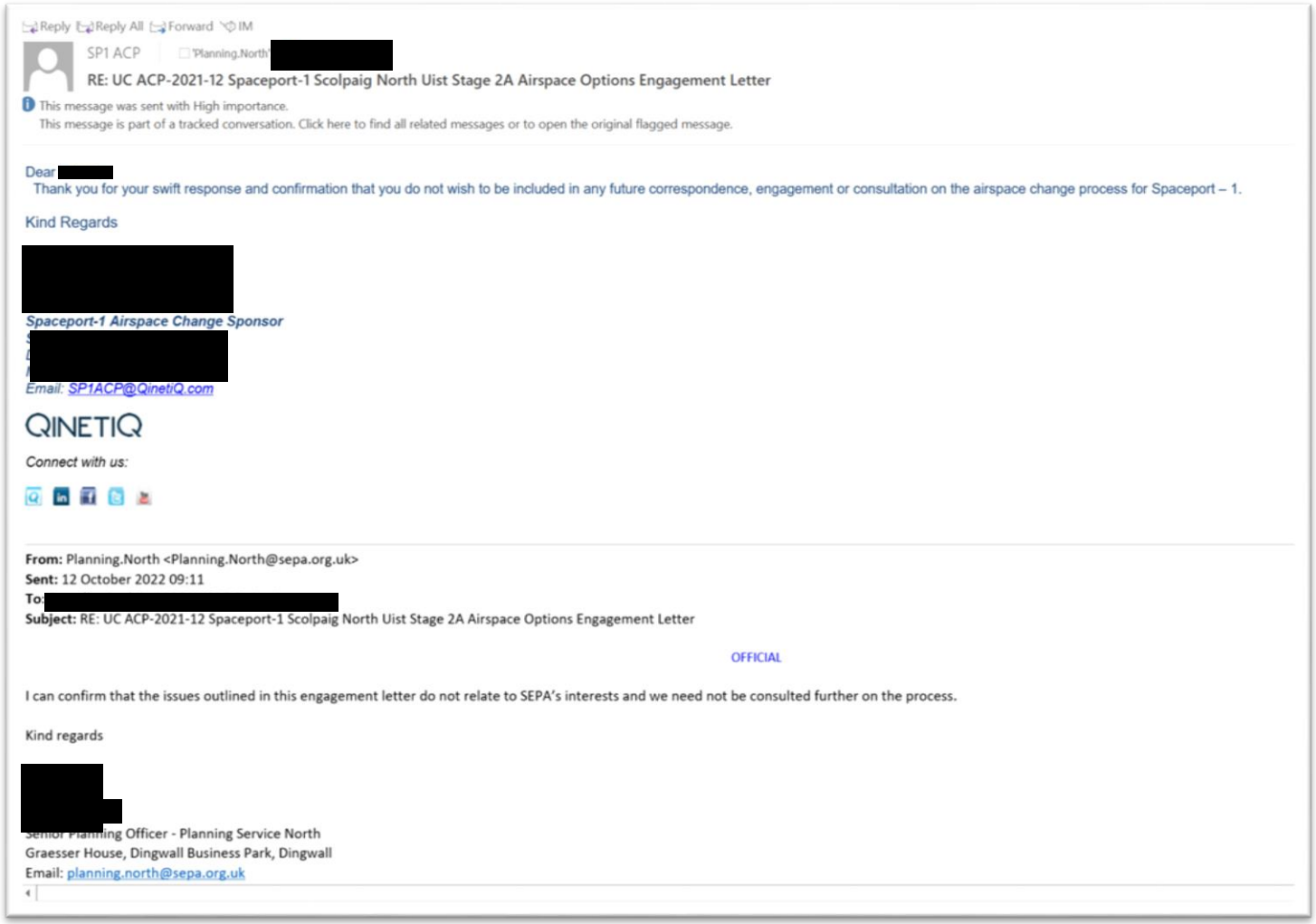
It would be useful to understand your process and I look forward to hearing from you further in that regard.

Regards

[redacted], Planning Manager, (Development Management),
Comhairle nan Eilean Siar | Balivanich | Benbecula | HS7 5LA. mferguson@cne-siar.gov.uk Telephone [redacted]
Ag Obair Comhla airson na h-Eileanan Siar **COMHAIRLE NAN EILEAN SIAR** Working Together for the Western Isles

From: CNES Public Planning <planning&design@cne-siar.gov.uk>
Sent: 11 October 2022 11:14
To: [redacted]
Cc: [redacted]
Subject: FW: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter


RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter - Message (HTML)
File
Message
Kofax PDF
Tell me what you want to do...
Ignore
Junk
Delete
Reply
Reply All
Forward
Meeting
IM
More
Christmas Do
Team Email
Reply & Delete
To Manager
Done
Create New
Move
Rules
OneNote
Actions
Mark Unread
Categorize
Follow Up
Translate
Find
Related
Select
Zoom
Wed 12/10/2022 15:42
[redacted]
RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter
To SP1 ACP
Dear [redacted]
That is useful; I will discuss with Anne (the planning casework officer) on her return from leave on our input or otherwise.
Regards
Mòrag NicFhearghais, Manaidsear Dealbhaidh : Morag Ferguson, Planning Manager, (Development Management),
Comhairle nan Eilean Siar | Ballvanich | Benbecula | HS7 5LA. mferguson@cne-siar.gov.uk Telephone 01870 604990 or 01851 822690.
Ag Obair Comhla airson na h-Eileanan Siar COMHAIRLE NAN EILEAN SIAR Working Together for the Western Isles
From: SP1 ACP <SP1ACP@qinetiq.com>
Sent: 12 October 2022 15:29
To [redacted]
Cc [redacted]
Subject: RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter
You don't often get email from sp1acp@qinetiq.com. Learn why this is important
WARNING: THIS EMAIL CAME FROM OUTSIDE THE COMHAIRLE; PLEASE TREAT HYPERLINKS OR ATTACHMENTS WITH CAUTION. CONTACT THE IT HELPDESK IF IN ANY DOUBT.
Dear [redacted]
Thank you for your swift response. With regard to your question regarding the Airspace Change Proposal (ACP) process, full details can be found in Civil Aviation Publication (CAP) 1616 available at: CAA_Airspace Change Doc_Mar 2021_INTERACTIVE.pdf. In summary, the ACP process is a 7 stage process consisting of several Steps (within each Stage) and decision points known as 'Gateways' (where the CAA review documentation and allow the ACP to move onto the next Stage). Stages 1 & 2 are involved in developing the airspace design principles, airspace options and appraisal – all involve stakeholder engagement including non-aviation stakeholders such as local councils and interested organisations. We are at Stage 2 Step 2A 'airspace design options'; these are being shared with stakeholders to gain feedback and suggestions, it also enables organisations/interested parties to raise any issues they see with the airspace options presented. Once feedback is complete we, as the airspace Sponsor, produce a report detailing the airspace options, how they meet (or not) the design principles and a complete record of the engagement process and feedback. The Sponsor then enters Stage 2B 'options appraisal' where, based on the feedback, the options are all compared and pros and cons articulated. The Sponsor has to choose a preferred option and rationale behind the choice as well as demonstrating the cost benefits. A further report is produced and delivered to the CAA for their assessment (Gateway). They may call for elements of the process to be revisited or, if satisfactory, allow the ACP to move to Stage 3 'Consult'. Here the Sponsor has to pull together consultation material, processes and a consultation plan that meets with CAA approval. Only then can the 'formal consultation process' on the chosen airspace change, commence. The airspace is still far from a 'done deal' as the consultation may necessitate changes or, if the objections are sufficiently robust and have grounds for further review, the CAA may ask the Sponsor to revise his options. Only at the end of Stage 3 is the final airspace option updated/refined and submitted to the CAA under Stage 4. During Stage 5 the CAA review all documentation, engagement and consultation to date to ensure the Sponsor has complied fully with the requirements of CAP 1616 in a fair and balanced manner. This review takes several months and the Sponsor might be called to provide further evidence. Only when all this work is complete will the CAA make a decision and if approved, the airspace will be implemented sometime later during Stage 6. The final stage (7) is a post implementation review following the airspace being in place circa 12 months – here the CAA may revoke the decision to implement the airspace if it is not being used as advertised, is having a greater than expected adverse effect on stakeholders or is not being used.
As you can imagine several of the stakeholders in this process will be the same as for the planning and environmental processes and some of the requirements are similar to both (for example the airspace process calls for environmental assessments not just at the launch site but also to any disruption to the air traffic management network that may necessitate aircraft to fly longer routes around the spaceport activities). We will be using elements of the EIA to support our work going forward.
With regard to further engagement on the airspace change process, you may decide what works best for you. If you think it worthwhile then please complete the feedback form attached to the letter with your comments or, alternatively, let me know if you do not wish to be fully engaged in the process. As we meet weekly (virtually) with [redacted] suspect [redacted] will be able to keep you informed of the ACP progress and any future consultation meetings/information associated with Stage 3.
I hope this helps clarify the ACP process, if you have any further questions please do not hesitate to contact me.
Kind Regards
[redacted]
Spaceport-1 Airspace Change Sponsor
[redacted]
Email: SP1ACP@QinetiQ.com
QINETIQ



Reply Reply All Forward IM

SP1 ACP Planning.North [redacted]

RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

This message was sent with High importance.
This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

Dear [redacted]
Thank you for your swift response and confirmation that you do not wish to be included in any future correspondence, engagement or consultation on the airspace change process for Spaceport – 1.

Kind Regards

[redacted]
Spaceport-1 Airspace Change Sponsor
[redacted]
Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

From: Planning.North <Planning.North@sepa.org.uk>
Sent: 12 October 2022 09:11
To: [redacted]
Subject: RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

OFFICIAL

I can confirm that the issues outlined in this engagement letter do not relate to SEPA's interests and we need not be consulted further on the process.

Kind regards

[redacted]
Senior Planning Officer - Planning Service North
Graesser House, Dingwall Business Park, Dingwall
Email: planning.north@sepa.org.uk

Reply Reply All Forward IM

Planning.North <Planning.North@sepa.org.uk> [redacted]

RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

Follow up. Start by 12 October 2022. Due by 12 October 2022.
You replied to this message on 12/10/2022 11:05.

OFFICIAL

I can confirm that the issues outlined in this engagement letter do not relate to SEPA's interests and we need not be consulted further on the process.

Kind regards

[redacted] Planning Service North
Graesser House, Dingwall Business Park, Dingwall
Email: planning.north@sepa.org.uk

Disclaimer
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SPACE PORT 1

Wed 09/11/2022 19:41

[redacted]

UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

To Brundle, Paul R

If there are problems with how this message is displayed, click here to view it in a web browser.

[redacted]

Thank you for your e-mail and attachment (**ACP-2021-12 - Spaceport 1 North Uist Stage 2 Step 2A Airspace Design Options - Stakeholder Engagement**) of 11/10/2022.

My/our interest is in the general overall proposal to develop Scolpaig Farm as a spaceport, and as I/we are not airspace users as such this interest is not restricted to airspace design and the current airspace change process. It is, however, important for us to understand this process, and its conclusions and effects on the potential overall development proposals.

As we are not airspace users, we offer no comment with regard to the airspace design options highlighted. We do, however, have significant concerns with regard to the detail contained in **Item 7.2 - Safety Analysis**.

Item 7.2 highlights the '' ... *lack of pedigree of sub-orbital rockets,*'' and states that ''*QinetiQ Range and safety staff have conducted a generic safety analysis approach using key US military and Federal Aviation Authority (FAA) reference documentation as well as experience gained from launching ballistic missile target rockets from the Hebrides Range in 2015.*''

The conclusion is that ''*The outcome of the analysis provides evidence to the CAA that the boundaries of the proposed segregated airspace fillet at Figure 4 present the maximum reasonable geographic extent of the region within which credible hazards could occur due to rocket launch and flight activities. It should be noted that the ground safety footprint may preclude rockets being launched in certain wind conditions where this causes debris to fall over the land areas.*''

The ''*fillet*'' in Figure 4 covers virtually the whole of the northwest area of North Uist, so what this is effectively saying is that this whole area contains credible hazards. We would doubt if this is what was intended to be said, as it would effectively rule out any spaceport development, but it is what is said. It is also ambiguous with regard to the comment about debris falling over land area (which is not otherwise defined).

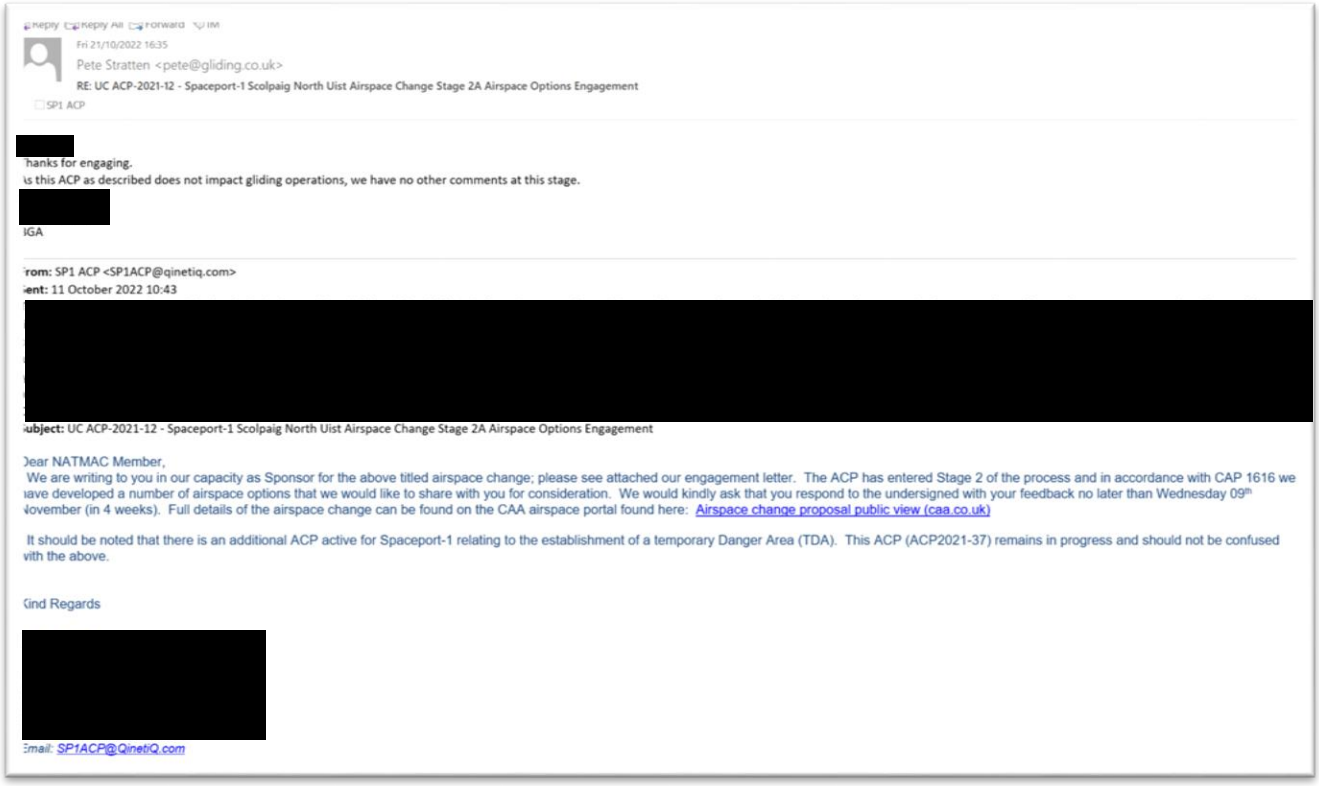
Could this matter please be investigated and clarified, including the extent of the ''*ground safety footprint*''. Thank you.

This commentary and these requests are offered against Item A.5 of your Stakeholder Feedback Form.

With best regards,

[redacted]

And on behalf of Friends of Scolpaig.



Reply Reply All Forward IM

Fri 21/10/2022 16:35

Pete Stratten <pete@gliding.co.uk>

RE: UC ACP-2021-12 - Spaceport-1 Scolpaig North Uist Airspace Change Stage 2A Airspace Options Engagement

SP1 ACP

[redacted]

Thanks for engaging.

Is this ACP as described does not impact gliding operations, we have no other comments at this stage.

[redacted]

IGA

From: SP1 ACP <SP1ACP@qinetiq.com>

Sent: 11 October 2022 10:43

[redacted]

Subject: UC ACP-2021-12 - Spaceport-1 Scolpaig North Uist Airspace Change Stage 2A Airspace Options Engagement

Dear NATMAC Member,

We are writing to you in our capacity as Sponsor for the above titled airspace change; please see attached our engagement letter. The ACP has entered Stage 2 of the process and in accordance with CAP 1616 we have developed a number of airspace options that we would like to share with you for consideration. We would kindly ask that you respond to the undersigned with your feedback no later than Wednesday 09th November (in 4 weeks). Full details of the airspace change can be found on the CAA airspace portal found here: Airspace change proposal public view (caa.co.uk)

It should be noted that there is an additional ACP active for Spaceport-1 relating to the establishment of a temporary Danger Area (TDA). This ACP (ACP2021-37) remains in progress and should not be confused with the above.

Kind Regards

[redacted]

Email: SP1ACP@QinetiQ.com

SPACE PORT 1

Wed 16/11/2022 14:32

SP1 ACP

RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

To [redacted]

Cc

This message was sent with High importance.

[redacted]

Thank you for your response and acknowledgement that you do not have any comments regarding the airspace design options presented. Regarding the matter of the airspace v the ground safety footprint, I offer the following:

The safety analysis process for aircraft and the parameters for assessing the volume of airspace required to ensure safety, are different to those when considering third parties on the ground, either on the land area or affected sea space. The variables, environmental effects and probability of risk are very discrete for each environment (air, land and sea) this invokes different boundaries. Furthermore, it is common practice to have an 'air Danger Area' over a land mass but this does not mean there is a hazard to all personnel on the ground beneath this volume of airspace. EG D704, which covers Benbecula airport and the surrounding area, is a good local example; this may be activated to segregate the hazardous activity from other airspace users but it does not mean third parties on the ground beneath D704 are at risk; the ground safety footprint will determine the risk to third parties and the area cordoned off as necessary. For SP-1, this cordon is considered the boundary of the spaceport.

I hope this explanation helps. Please do not hesitate to contact me if you have any further questions.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

SPACE PORT 1

RYA Scotland

Royal Yachting Association Scotland

RYA Scotland

Caledonia House
1 Redheughs Rigg
South Gyle
Edinburgh
EH12 9DQ

T +44 (0)131 317 7388
E admin@ryascotland.org.uk
W www.ryascotland.org.uk

17 October 2022

[redacted]
Spaceport-1 Airspace Change Manager
[redacted]
AT Building
QinetiQ
Malvern Technology Centre,
St Andrews Road,
Malvern,
Worcestershire
WR14 3PS

[redacted]

Dear [redacted]

ACP-2021-12 – Spaceport 1 North Uist Stage 2 Step 2A Airspace Design Options – Stakeholder Engagement

We in RYA Scotland have no comments to make about the airspace options. As you know, we are more concerned about the sea under that airspace. I know from previous engagement with you that a clear range procedure will be used and I am unaware of any problems with the existing Hebrides range.

Yours sincerely,

[redacted]
Planning and Environment Officer, RYA Scotland

SPACE PORT 1

Reply Reply All Forward IM

Tue 08/11/2022 12:03

[redacted]

HIAL feedback to ACP-2021-12 design options letter of 11/10/22

To [redacted]

Cc

Follow up. Start by 14 November 2022. Due by 14 November 2022.
You replied to this message on 15/11/2022 10:55.

ACP-2021-012 HIAL Feedback.pdf
87 KB

Dear [redacted]

Please find attached by way of feedback from Benbecula ATC, Stornoway ATC and HIAL HQ the answers to the questions asked at Annex A of your, Spaceport 1 North Uist Stage 2 Step 2A Airspace Design options – Stakeholder engagement letter of 11 Oct 2022.

In answering these question the units noted and HIAL HQ carried out a joint review on the options offered and the feedback is recorded. You will note that there are expanded comments in some of the answers in particular around present and future LOAs and processes and procedures for future operational liaison with Benbecula ATC.
In addition it would be helpful to have an update on ACP-2021-037 for a TDA in the same location as this permanent Airspace change.

Many thanks

[redacted]
ATM Project Manager, Operational Design Authority
Highlands and Islands Airports Limited
[redacted] www.hial.co.uk

Name: [redacted]
Representing: Benbecula ATC, Stornoway ATC and HIAL ATM HQ
Address: Highlands and Islands Airport Ltd, Inverness Airport, Dalcross, Inverness IV2 7JB

A.1	Design Principle	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
1	The safety of all airspace users is the paramount factor in the airspace design	Not Met	Not Met	Met	Met	Not Met	Not Met
2	The airspace design will be of the smallest volume to safely segregate Spaceport activities from other airspace users thereby minimising the impact on other airspace users	N/A	Met	Met if Figure 5 used	Met if Figure 5 used	Not Met	Not met
3	Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations	Not Met	Partially Met	Partially Met	Partially Met	Partially Met	Partially Met
4	Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures operated within the EG D701 complex	N/A	Not Met	Not Met	Met	Met	Met
5	Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the airspace design	Not Met	Met	Met using existing LOA principles	Met using existing LOA principles	Met using new LOA principles	Met using existing LOA principles
6	The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA Buffer Policy	N/A	Not Met	Not Met	Met	Met	Met
7	The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the Danger Areas due to SP-1 activities	N/A	Partially Met	Partially Met	Partially Met	Partially Met	Partially Met
8	The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018	N/A	Not familiar with Space regs	Not familiar with Space regs	Not familiar with Space regs	Not familiar with Space regs	Not familiar with Space regs
9	Rocket stage drop zones may be required outside EG D701 and will need to be considered	N/A	N/A	N/A	N/A	N/A	N/A

	Which design option do you believe best delivers the DPs?	Option 3

A.2	Feedback on preferred type(s) of segregated airspace to be implemented (including order of preference and rationale, if appropriate).	Class G Danger Area

A.3	Would this proposal impact you (or members of your organisation) and, if so, are there any changes you would like to put forward for consideration?	Yes. It would need to be assured that coordination can be affected when requested so as not to restrict operations at EGPL. Assess and consider the MAP for the IAPs at EGPL Ensure that Launch operations are deconflicted from schedule movements and CAT A flights. Assurance that direct line communications will be available for coordination of launches

A.4	What is your biggest concern regarding this airspace change?	That effective coordination will be able to take place in a timely manner and the launch director will be always available during airspace notification.

A.5	Do you have any other feedback for the Sponsor?	Please provide an update on ACP-2021-037 for a TDA associated with SP-1 as the Airspace portal indicated a need for it in Oct/Nov this year.

Reply Reply All Forward IM

Tue 15/11/2022 10:56

SP1 ACP

RE: UC HIAL feedback to ACP-2021-12 design options letter of 11/10/22

To [redacted]

Cc

Dear [redacted]nd HIAL Team,

Thank you kindly for your response and completed feedback form; comments will be considered in the next step of the process, the options appraisal. With regard to the TDA, as prescribed in ACP-2021-37, I can now confirm that this requirement has been further delayed until August 2023 at the earliest. There remain a number of factors outside the ACP process that will determine the exact date of the first launch. I intend to write out to stakeholders soon explaining this further delay and our revised launch date expectation.

Kind Regards

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

[redacted]

Reply Reply All Forward IM

Wed 16/11/2022 15:55

SP1 ACP

RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options Engagement Letter

To [redacted]

Cc

Option_5_Two_Pot_Solutions.PNG
511 KB

[redacted]

Many thanks to you and the team for your response that has been incorporated into the design options report. With regard to the point raised I offer the following:

- We fully support the MOD feedback and work is ongoing to formalise use of D701 under the LTPA.
- The sub-divisions of D701 can be further simplified to reduce the number of additional areas and still meet the SP-1 requirements and that of the Hebrides Range (PSA).
- The UK SpOC will be afforded the necessary information to undertake their duties as this is a requirement placed on the rocket provider as part of their approvals/permissions process.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

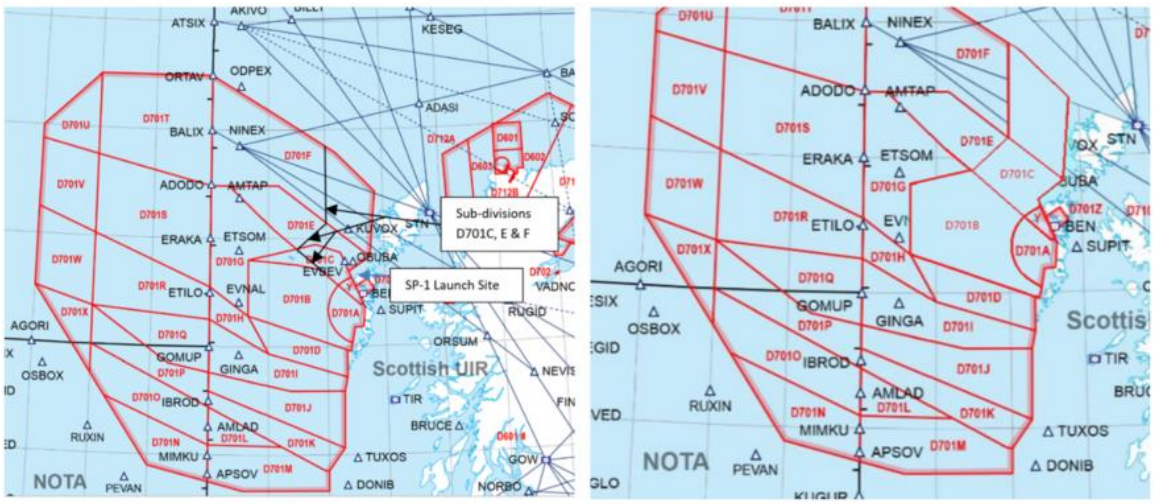


Figure 15: Two potential modifications to D701 option 5

Reply Reply All Forward IM

Wed 16/11/2022 16:15

SP1 ACP

RE: UC ACP-2021-12 Spaceport-1 Scolpaig North Uist Stage 2A Airspace Options NATS Response

To [redacted]

Cc

Bcc

[redacted]

Many thank the NATS formal response to ACP-2021-12 Stage 2 Step2A. Your points have all been noted and captured in the airspace options report; in response to the key points raised I offer the following:

- Option 4 will be considered in the options appraisal at Step 2B as it is accepted several DPs make specific reference to use of D701 and this should not exclude the radical option of a wholly new airspace design (this is captured in the DP evaluation for Option 4).
- Furthermore, option 4 has been modified to provide a more symmetrical airspace design.
- Option 5 has similarly been modified with a view of reducing the impact on OEPs and to simplify the design.
- The NE corner of the airspace 'fillet' cannot be reduced further as suggested, as this airspace is needed for launches to the North where this area is necessary in the event of any catastrophic failure of the vehicle and subsequent debris field.
- We acknowledge that any DA with UNL will encroach both Class A and C airspace although it is suggested that when activated and such DA will be used as Class G.
- All other points are noted and will be addressed as the ACP process progresses.

Kind Regards

[redacted]

Spaceport-1 Airspace Change Sponsor

[redacted]

Email: SP1ACP@QinetiQ.com

QINETIQ

Connect with us:

SPACE PORT 1

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

By email to: SP1ACP@qinetiq.com
[redacted]
Spaceport-1 Airspace Change Sponsor
QinetiQ
Safety Engineering

Longmore House
Salisbury Place
Edinburgh
EH9 1SH
[redacted]
T: 0131 668 8960

Our case ID: 300029751

08 November 2022

Dear [redacted]

Spaceport-1, Scolpaig, North Uist - Stage 2A, Airspace Options Engagement - Airspace Change Proposal

Thank you for your correspondence of 11 October 2022 offering the opportunity to comment on design options to inform the airspace classification in relation to the Scolpaig spaceport. Having considered the supplied information we can confirm that we have no comments to offer.

We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is [redacted] who can be contacted by phone on [redacted]

Yours sincerely

Historic Environment Scotland

SPACE PORT 1

From: [redacted]
Date: Thursday, 03 Nov 2022, 8:35 pm
[redacted]
Subject: RE: DA ACP-2021-12 Spaceport-1 Scapa South Ext Stage 2A Airspace Options Engagement Letter

Dear [redacted]

The MOD would like to thank QinetiQ for the opportunity to provide feedback on ACP-2021-12 Space Port 1 (SP1). Whilst discussions have already taken place between Qinetiq and the MOD on some of the subjects described in this feedback, please accept this email as the full formal MOD response to Stage 2 for your consideration. There is some similarity to the feedback given for the TDA ACP which I have also included in this email for full transparency and topics for discussion moving forwards.

Design Options and Design Principles (DPs)

Options 0, 1 and 2 do not meet as many of the DPs as Options 3 to 5. Full ASM processes for activation of the airspace should be followed to ensure the most efficient flexible use of the airspace between civil and military, which Options 3 to 5 all appear to utilise and Options 1 and 2 don't.
Options 4 and 5 will require new SUAs or changes to existing SUAs which may increase the complexity of the airspace in that area. If further subdivisions or new segments of SUA would help reduce the impact on OEP usage then the MOD would be happy to help explore these options further. As discussed in a previous meeting the MOD are happy to agree in principle to support subdivision of the D701s providing that the change would be cost neutral to the MOD, with the exception of the usual mapping and procedure changes. It was also discussed that further cost benefit analysis should be undertaken by the Sponsor to ensure that any potential additional ACP work to subdivide or create new SUAs would be cost effective for the number of activations per year that were planned.
In summary, the MOD believe Option 3 appears to be the most suitable to meet the DPs as there are existing ASM processes, protocols and SUA available, albeit that further discussions and agreements on usage and impacts will be required as the CAP1616 process progresses.

Location of the Proposed DA

Regarding the location of the DA required for SP1, the MOD assess that there is a negligible impact to operations, as it is adjacent to existing Danger Areas (EG D701 and EG D704). The location of the small danger area and activation times would also have negligible impact on the MOD.

Frequency of Launches

The MOD believe that the planned frequency of launches is low enough to have minimal impact providing that activity is suitably deconflicted with planned D701 usage and other military exercises in the area, such as Ex JOINT WARRIOR. The MOD believe this is covered in Para 6.2.1 of your Letter as is the need to agree protocols (including OEP restrictions) between all relevant stakeholders including the MOD. The MOD are happy to lean in and support such work where required.

D701 Usage, Notification and Access

Usage of the D701 would need to be covered under the Long Term Partnering Agreement as previously discussed and acknowledged by Qinetiq.

The UK Space Operations Centre (UK SpOC) is responsible for monitoring and reporting of all UK space launch activities. The UK SpOC require information on numerous elements of a launch and subsequent activity, including but not limited to; notification of upcoming launches, launch area, drop and abort zones, mission profiles, tracking data, frequencies and understanding go/no go criteria. This information will be used to enable the UK SpOC to Detect, Track, Characterise and Report (DTCR) UK space launches. The UK Space Operations Centre would require notification of any rocket launch irrespective of whether it is sub-orbital or not.

The MOD acknowledge and support the statement in para 9.2 ref national security access to the activated DA. The use of already established MOD Range controllers indicates that management of access in the aforementioned circumstances would be similar to current procedures and practices.

Please do not hesitate to contact the undersigned if further information, discussion or clarity is required.

Regards

[redacted]

NATS Feedback to ACP-2021-12 – Permanent Danger Area for Spaceport 1

Name: [redacted]

Representing: NATS

Address: CTC, 4000 Parkway, Whiteley, Fareham, PO15 7FL

Question A.1: Do you assess that the presented design options achieve the Design Principles (DPs); please complete the Proforma below accordingly and consider if they are 'Met', 'Partially Met' or 'Not met' in your opinion. Add your rationale in free text as appropriate.

Design Principle		Option	Option 1	Option 2	Option 3	Option 4	Option 5
1	The safety of all airspace users is the paramount factor in the airspace	**NO**	Questionable	Questionable	YES	YES	YES
2	The airspace design will be of the smallest volume to safely segregate Spaceport activities from other airspace users thereby minimising the	Not Considered	YES	**NO**	**NO**	YES	Unclear (other subdivisions might be necessary)
3	Minimise the impact (on other aviation stakeholders) of activating specific EG D701 Danger Areas in support of SP-1 operations	Not Considered	YES (though not EG D701)	**NO**	**NO**	YES (though not EG D701)	Unclear (other subdivisions might be necessary)
4	Use Flexible Use of Airspace (FUA) principles by integrating the airspace design into the extant Airspace Management (ASM) procedures	Not Considered	**NO**	**NO**	Potentially	Potentially (though not EG D701)	Potentially

5	Integrating/deconflicting SP-1 activity safely with MOD activity in EG D701 is a vital element of the operational use of the	Not Considered	Relates to Utilisation, not Design	Relates to Utilisation, not Design	Relates to Utilisation, not Design	Relates to Utilisation, not Design	Relates to Utilisation, not Design
6	The airspace design shall take into account Free Route Airspace (FRA) and Flight Planning Buffer Zones (FBZs) remaining cognisant of CAA	Not Considered	**NO**	Unclear	YES	YES	YES
7	The airspace design and associated activation of EG D701 need to consider the environmental impact of aircraft being re-routed around the Danger Areas due to SP-1 activities	Not Considered	YES (though not EG D701)	**NO**	**NO**	YES (though not EG D701)	Depending on Design
8	The airspace design will need to consider any emerging regulations pertaining to spaceports and Ranges under the Space Industry Act 2018	Not Considered	Valid point but implications currently unclear	Valid point but implications currently unclear	Valid point but implications currently unclear	Valid point but implications currently unclear	Valid point but implications currently unclear
9	Rocket stage drop zones may be required outside EG D701 and will need to be considered	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
		NATS agrees this Option is not viable for Space Launch as it is not safe.	NATS believes this Option fails to meet at least 2 DPs.	NATS believes this Option fails to meet at least 4 DPs.	NATS believes this Option fails to meet 3 DPs.	NATS considers this to be the best Option in terms of satisfying the DPs.	NATS has identified no "DP fails" for this Option but does have questions about how it addresses a number of DPs.

Which design option do you believe best delivers the DPs?

NATS believes Option 4 best delivers the Design Principles, as indicated in our assessment above.

Question A.2: Feedback on preferred type(s) of segregated airspace to be implemented (including order of preference and rationale, if appropriate).
NATS believes a modular Danger Area complex would be the best type of airspace construct for this activity.
Please note that (contrary to the implication in Table 2 of your letter of 11th October 2022) a Surface to Unlimited Danger Area in this location will encompass both Uncontrolled and Controlled Airspace, not just Uncontrolled Class G.

Question A.3: Would this proposal impact you (or members of your organisation) and, if so, are there any changes you would like to put forward for consideration?
This proposal will have an impact on NATS' and its customers' operations.The nature and scale of the impact will be dependent on a number of factors, including the technical solution selected, the time(s) of day the Danger Area complex isactivated, and the number and duration of such activations.Given the complexity of the potential interactions, NATS anticipates that there will need to be some detailed bilateral conversations to help define/refine specific proposals.

Question A.4: What is your biggest concern regarding this airspace change?
The potential individual and cumulative impact of this and other nearby activities on scheduled airline traffic heading to/from the North Atlantic. For both financial and environmental reasons, airliners need to be given as efficient flightpaths as possible. The use of a Danger Area for commercial purposes, while entirely legitimate, potentially puts one set of commercial interests in conflict with others.

Question A.5: Do you have any other feedback for the Sponsor?

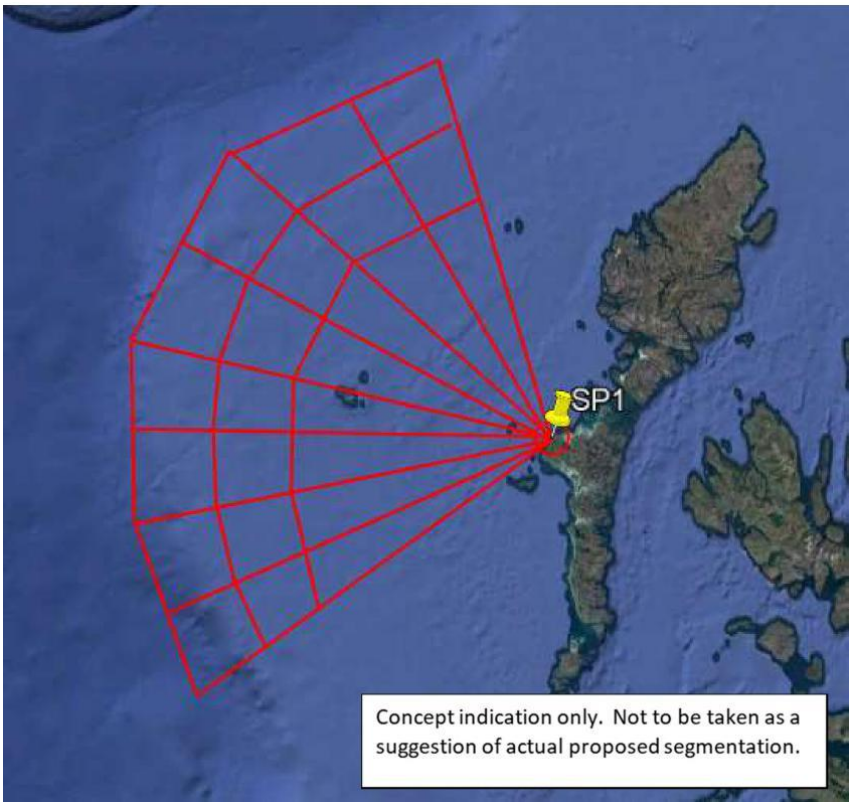
1. There are multiple references to the use of D701 in the Design Principles. In some cases, they appear to imply that the use of D701 has been pre-determined as a technical solution, which would be contrary to the requirements of CAP 1616. Also, as currently worded, these DPs are incompatible with Options 1 and 4 which explicitly propose an alternative solution to the use of D701.
   NATS suggests the Sponsor discusses with the CAA to identify an appropriate way forward. Using a phrase such as "the relevant airspace" might be a potential resolution.
2. NATS notes the revised boundary of the DA element around the Spaceport 1 launch site itself (Figure 4) following Stakeholder input, and asks whether (in the interests of minimising the amount of airspace affected) the North Eastern corner of this element could be moved further to the South West, reducing the size of the "dog leg" on the Eastern side of this element.

3. As already acknowledged, in due course, NATS will expect to see proposals from the Sponsor for Flight Plan Buffer Zones (FBZs) for at least the Domestic (Scottish FIR) components of the Danger Area complex.

4. As we discussed at the meeting on 18th October 2022, NATS believes that a modular Danger Area complex, with components sized and shaped to suit the nature of the generic types of rockets which are anticipated to use the range, would be the most suitable solution. As we also noted, the North Atlantic technical support systems do not work with curves, so we would suggest a fan shape made up primarily of straight lines would be the best design to protect the airspace volume in which the rockets will fly.
   We offer an example below purely as an illustration. Clear the exact number, width, and length of the segments would be designed by the Sponsor so as to meet the twin obligations of delivering safety to all relevant Airspace Users while minimising the amount of airspace contained with the activated Danger Area at any

one time.

NATS Public


SP1
Concept indication only. Not to be taken as a suggestion of actual proposed segmentation.