Snowdonia Aerospace Airspace Change Proposal Design Options Development (Stage 2A), ACP-2019-58 Llanbedr Danger Area (DA) – Version 3

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Document Details

Approval Level	Name	Authorisation
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1.0	First formal release incorporating analysis of the stakeholder engagement	19th June 2020
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3.0	Updated to include Appendix A mapping the stakeholder feedback to Design Option decisions and conclusions	14th August 2020

Executive Summary

This report documents the "Stage 2A Options Development" element of the Snowdonia Aerospace LLP submission for an Airspace Change Proposal, Reference: ACP-2019-58, Llanbedr Danger Area (DA), under the Civil Aviation Authority (CAA) CAP1616 Airspace Change Process.

Snowdonia Aerospace LLP is continuing to progress and further develop a number of complementary business opportunities at Llanbedr Aerodrome relating to aerospace Research, Development, Test and Evaluation (RDT&E) and military aircraft training. To support these operations (and others) action is required to upgrade and formalise the current airspace around the Aerodrome as the present provision is insufficient to meet the identified future need and risks restricting opportunities that are in the strategic economic interest of the UK and Welsh governments and required to sustain long term employment in the region. Snowdonia Aerospace LLP (hereafter also referred to as the Change Sponsor) is therefore developing two Airspace Change Proposals (ACPs) to underpin these activities:

- ACP-2019-58, Llanbedr Danger Area (DA), which can be accessed online via: https://airspacechange.caa.co.uk/PublicProposalArea?pID=193
- ACP-2020-02, Llanbedr Aerodrome Traffic Zone (ATZ), which can be accessed online via: https://airspacechange.caa.co.uk/PublicProposalArea?pID=211

This document relates to the former application, ACP-2019-58, with a view to creating a permanent Danger Area that will enable Llanbedr Aerodrome to increase support to the RDT&E for next-generation UK aerospace - *e.g.* drones (particularly non-military "drones for good"), electric aircraft, urban/regional air mobility vehicles, balloons, airships, near-space testing *etc*.

The CAA Civil Aviation Publication CAP1616 defines a six-stage process through to implementation of a permanent airspace change, some of which have more than one step. This document addresses the requirements for Stage 2A: Options Development. The objectives for Stage 2A are as follows:

- identify all the possible airspace design options;
- evaluate the design options against the design principles from Stage 1B;
- evaluate that the design options are compliant with the required technical criteria.

The following conclusions have been drawn from the Stage 2A: Options Development process:

1. SAC has prepared two design options for the Danger Area (DA) and requested further feedback and comment from the stakeholders and interested parties previously engaged on the Design Principles. A side-by-side comparison of the design options is shown in Figure 1a and 1b;
2. In both cases, the design provides an area of segregated airspace local to Llanbedr Aerodrome for the RDT&E of novel aerospace systems and an air corridor that will link Llanbedr Aerodrome with the existing Danger Area D201;
3. Option #1 describes a baseline for the DA airspace change based on the Temporary Danger Area (TDA) that was originally consulted on, approved and promulgated in 2014. Option #2 is a further refinement based on feedback received as part of the two-way engagement process on the Design Principles;
4. As far as possible, the shape of both DA options has been designed to be easy to interpret and implement and the size has been designed to accommodate a range of different novel aerospace systems. Outline Air Traffic Management principles have also been identified for both options;
5. Option #1 was considered to be easier to interpret and to provide greater flexibility for operators using the DA, whereas Option #2 was considered to be more complex but offered more advantages in terms of flexible use of airspace;

6. Other local airspace users, both military and general aviation, and a local landowner identified possible potential conflicts, but SAC is sympathetic to the needs of other stakeholders and we believe a mutually satisfactory compromise is very easily achievable. An action was identified for continued engagement to further refine the details and operating procedures that will inform the Letters of Agreement with these other stakeholders;
7. For both design options, the number of days of DA sub-area activation per year is likely to provide further mitigation of airspace access issues. Utilisation, and other safety, operational, environmental and economic considerations, will be addressed in more detail as part of the analysis supporting the Stage 2B Options Appraisal;
8. Some stakeholders (mostly non-aviation) felt unable to comment pending further clarification. We must also consider how future engagement/consultation materials are developed to suit a range of audiences, such as how technical information will be communicated in an accessible way to non-aviation stakeholders.
9. On the basis of the feedback received, but also recognising the ongoing engagement actions identified in (6) and (8) above, we believe the Design Principles and Design Options that have been developed to date are fundamentally sound and suitable for taking forward into the next stages of the airspace change process.

The design options stated here together with the previous design principles from Stage 1B will be used to inform the Design Options Appraisal (Stage 2B). More generally, the conclusions will also be used to help inform the Consultation Preparation (Stage 3A). As an immediate follow-on activity, SAC will also write back to all respondents with a thank you letter and seek to identify opportunities for further engagement/consultation that will address the action items described in (6) and (8) above.

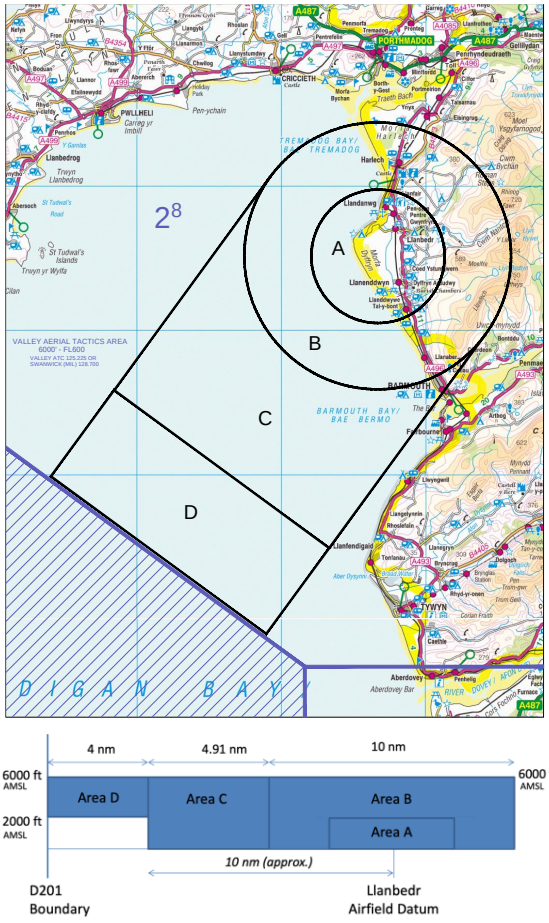

Fig. 1a *– Airspace Design Option #1 for ACP-2019-58, Llanbedr Danger Area*

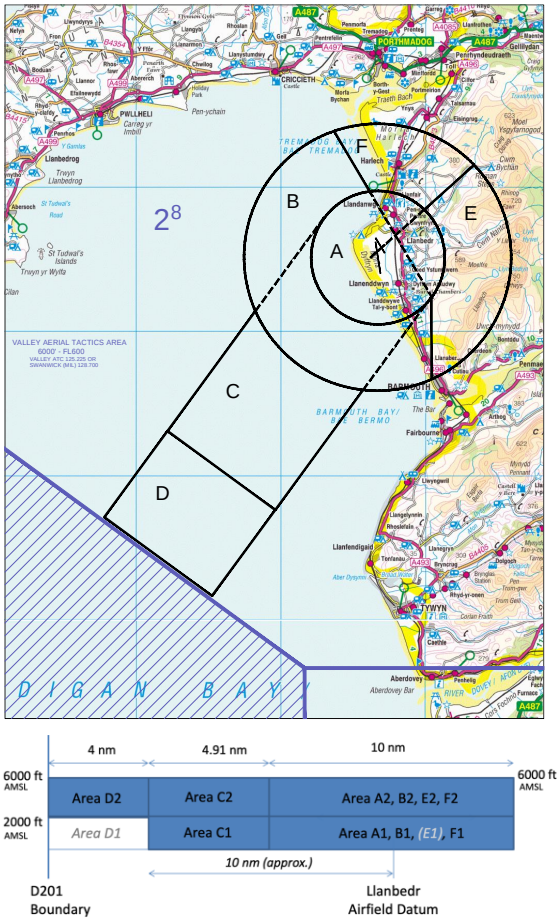

Fig. 1b *– Airspace Design Option #2 for ACP-2019-58, Llanbedr Danger Area*

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1. Introduction

1.1. Background

Llanbedr Aerodrome (EGFD), Gwynedd (Figures 2a-2d), is sited on a coastal promontory at the northerly end of Cardigan Bay[1] with bi-directional over-water approaches to the 2000m+ main runway (17/35), which is at an elevation of 8m above mean sea level. There are two additional cross runways 05/23 and 15/33. Under upcoming aerodrome licensing proposals it is currently intended the runways will be 2,188m, 1,199 and 799m respectively. The local geography is predominantly coastal lowland and farmland within Snowdonia National Park that is bounded to the east by the Rhinog mountains, which rise to 756m at a distance of 9500m (approx.) from the main runway. The village of Llanbedr (population 645, 2011 census) is 2000m (approx.) to the north-east of the northern threshold and there's also a transitory population during summer months at the Shell Island campsite (approx. 1000m to the north-west of the main runway northern threshold) and the Dyffryn caravan park (approx. 500m to the south of the main runway southern threshold). The overall population density is consistent with that for Gwynedd as a whole - *i.e.* <50 people per square km[2,3].

Fig. 2a *- aerial view looking west*

Fig. 2b *- aerial view looking east*

Fig. 2c *- aerial view looking north*

Fig. 2d *- aerial view looking south*

Llanbedr Airfield has a long history and established use for the research, development, test and evaluation (RDT&E) flying activities, particularly associated with the use of target drones, and also as a secondary/tertiary operating site for RAF Valley (EGOV, approx. 58km north/north-west). An Aerodrome Traffic Zone (ATZ)[4] and the original Danger Area D202 supported these activities prior to QinetiQ/MOD vacating the site in 2004, along with extant Danger Area D201, the closest edge of which is 25km (approx.) south-west of Llanbedr[5].

[1] View on Google Maps
[2] Ref: National Statistics Wales, June 2018
[3] Ref: Annual Lower Super Output Area (LSOA) Population Estimates, 2018
[4] Aerodrome Traffic Zone (ATZ) as detailed in Article 5 of the Air Navigation Order, 2016, Ref: Air Navigation Order, 2016
[5] Ref: https://www.aurora.nats.co.uk/htmlAIP/Publications/2018-08-02/html/eAIC/EG-eAIC-2018-087-Y-en-GB.html

The airfield currently supports an increasing mix of small (<20kg) and light (<150kg) drone RDT&E and General Aviation (GA) operations together with visiting military aircraft (fixed wing and rotary) and others including the search and rescue (SAR) helicopter from Caernarfon (EGCK, approx. 35km north/north-west), Police helicopter and Air Ambulance. The airspace is currently Class G. A local Flight Information Service (FIS) has been provided to support day-to-day operations and a Temporary Danger Area (TDA)[6] has previously been consulted on and implemented as and when required, either as a whole or in part, to support RDT&E activities and provide a safe corridor to D201. There are GA aircraft operations most flyable days with an average of 100 to 200 movements per month. The airfield has also been designated as one of the candidate sites for a UK Spaceport by the Department for Transport (DFT) and Snowdonia Aerospace LLP has recently received a grant award from the UK Space Agency to generate a Horizontal Spaceport Development Plan.

1.2. Opportunity to be addressed and Statement of Need

Snowdonia Aerospace LLP is continuing to progress and further develop a number of complementary business opportunities at Llanbedr Aerodrome relating to aerospace RDT&E and military aircraft training. To support these operations (and others) action is required to upgrade and formalise the current airspace around the Aerodrome as the present provision is insufficient to meet the identified future need and risks restricting opportunities that are in the strategic economic interest of the UK and Welsh governments and required to sustain long term employment in the region. Snowdonia Aerospace LLP (hereafter also referred to as the Change Sponsor) is therefore developing two Airspace Change Proposals (ACPs) to underpin these activities:

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This document relates to the former application, ACP-2019-58, with a view to creating a permanent Danger Area that will enable Llanbedr Aerodrome to increase support to the RDT&E for next-generation UK aerospace - *e.g.* drones (particularly non-military drones for good), electric aircraft, urban/regional air mobility vehicles, balloons, airships, near-space testing *etc*. The Statement of Need for the application is declared as follows:

- *To provide an environment for safe operation of all ongoing aerospace-related Research, Development, Test and Evaluation (RDT&E) activities in the vicinity of Llanbedr Airfield (EGFD) and the ability for associated aircraft to transit safely to/from Danger Area D201 to undertake extended range/endurance/altitude testing (in accordance with extant D201 procedures) without concern for other air traffic.*

The proposal explicitly supports the Airspace Modernisation Strategy (CAP1711) by creating a permanent test zone in which to explore the airspace integration issues associated with new airspace users such as drones that are currently identified as “unknowns” in Chapter 5 of CAP1711.

1.3. The cause of the opportunity and associated factors or requirements

The preface to the UK Government Aerospace Industrial Strategy, 2018, states that:

- *‘Environmentally-friendly aircraft will increasingly incorporate electric technologies, and we anticipate more aircraft operating autonomously in the future. New markets for drones and Urban Air Mobility vehicles will be developed. We want the UK to be at the cutting edge of these exciting developments much as we were when Sir Frank Whittle developed the world’s first jet engine’.*

Llanbedr has long been a UK national asset for aerospace RDT&E and there has been increased demand in recent years given its ideal location for Beyond Visual Line-of-Sight (BVLOS) drone testing.

[6] Ref: “Request for TDA “Approval in Principle” For UAS operations at Llanbedr Aerodrome”, QINETIQ/MS/AD/LET1404197, Sept 2014

These activities have been satisfied to date by use of a Temporary Danger Area, but both customer demand and the need for confidence and reliance are now such that an application for a Permanent Airspace Change is warranted. The combination of safety, operational, technical and environmental factors already pertaining to low volume RDT&E activities is not expected to change. Moving to a permanent Danger Area will allow an increase in throughput to satisfy the market need and provide UK businesses in these sectors with a surety of being able to operate in the UK on a reactive basis. Many UK businesses have chosen to undertake their testing abroad due to the uncertainties around availability of adequate and appropriate commercial trials environments. Figures 3a – 3f below gives an indication of some of the wide variety of novel aerospace systems and applications that have previously been tested at Llanbedr Aerodrome and which would benefit from a permanent Danger Area to help accelerate development and commercial exploitation.

***Fig. 3a** – Penguin B used to explore the potential for aeromedical delivery drones*

***Fig. 3b** – Vertical Aerospace electric Urban Air Mobility (UAM) vehicle*

***Fig. 3c** – Scheibel S100 Camcopter used to explore the potential for search/rescue drones*

***Fig. 3d** – Astigan solar-powered high altitude, long endurance (HALE) vehicle*

***Fig. 3e** – C-Astral Bramor used to explore the potential for mapping and surveying drones*

***Fig. 3f** – The view of Cardigan Bay from the B2Space near-space testing balloon*

2. Design Options and Design Principle Evaluation

2.1. CAP1616 requirements and document scope

The CAA Civil Aviation Publication CAP1616[7] provides guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, and on providing airspace information.

CAP1616 defines a six-stage process through to implementation of a permanent airspace change, some of which have more than one step. However, it is recognised that requested airspace changes can vary hugely in size, scale and complexity and this variation has led the CAA to scale the process accordingly (CAP1616, Para. 50). Furthermore, the CAA will consider requests from the Change Sponsor for additional scaling of the process when there is a good reason and it is proportionate to do so.

On the 23rd January 2020 the CAA Airspace Regulation team met with Snowdonia Aerospace LLP to discuss an appropriately scaled submission for ACP-2019-58, Llanbedr Danger Area. Subsequent to this meeting, the CAA agreed to a scaled CAP1616 submission with a combined Define, Develop and Assess Gateway in July 2020. To meet this combined Gateway, Snowdonia Aerospace as the Change Sponsor is required to submit the following documents:

- Stage 1A: Assess Requirements - Statement of Need (previously submitted)
- Stage 1B: Design Principles;
- Stage 2A Options Development;
- Stage 2B Options Appraisal.

This document addresses the requirements for Stage 2A: Options Development, which has the following objectives:

- to identify all the possible airspace design options;
- to evaluate the design options against the design principles from Stage 1B in a fair and consistent manner;
- to evaluate that the design options are compliant with the required technical criteria.

The remainder of this section describes the design option(s) for ACP-2019-58, Llanbedr Danger Area, as put forward by the Change Sponsor and evaluates the option(s) against the design principles from Stage 1B.

2.2. Design principles

The purpose of CAP1616 is to avoid “solutionising” and to impose a structured process that delivers a considered and balanced airspace design and implementation. In this regard the design principles precede the development of design options.

Snowdonia Aerospace (SAC) has undertaken a number of stakeholder engagement activities to help shape the Danger Area (DA) design principles. In addition to a number of targeted stakeholder meetings, a questionnaire was also sent out to over 200 stakeholders and interested parties.

The initial draft design principles were reviewed and revised to take account of feedback and reflect the observations and comments made as part of the two-way engagement process. The final statement of DA design principles is presented below in Table 1:

[7] Ref: https://publicapps.caa.co.uk/docs/33/CAP1616_Airspace%20Change_Ed_3_Jan2020_interactive.pdf

ID	Category	Design Principle
1	Technical	The design will provide an area of segregated airspace local to Llanbedr Aerodrome for the research, development, test and evaluation (RDT&E) of novel aerospace systems
2	Technical	The design will also provide an air corridor that will link Llanbedr Aerodrome with the existing Danger Area D201
3	Technical / Operational	The design will consist of multiple segments that should, where possible, allow the area of segregated airspace to be kept to a minimum in line with Flexible Use of Airspace principles while still meeting operational requirements
4	Technical / Operational	The Danger Area (DA) design will be consistent with the operation of the Aerodrome Traffic Zone (ATZ) (assuming successful conclusion of ACP-2020-02)
5	Safety	The design will not adversely affect the safety of operations at other nearby aerodromes
6	Safety / Operational	Operating hours of the Flight Information Service (FIS) and DA will be linked to ensure consistent traffic procedures and radio calls, and demand for changes in operating hours of the FIS will require a corresponding change in the operating hours of the DA and vice-versa
7	Environmental / Operational	Any impact on the environment and associated leisure activities should, where possible, be minimised via operating procedures and should, where possible, take account of any local development projects or noise sensitive areas that are highlighted as a result of stakeholder engagement
8	Environmental	The design should, where possible, take account of local planning policy including that of the Snowdonia National Park Authority and the aerodrome registered Safeguarding Map
9	Operational	Impact on military aircraft training should, where possible, be minimised via operating procedures in line with Flexible Use of Airspace principles
10	Operational	Impact on General Aviation (GA), gliding, microlight flying, hang gliding, paragliding or model flying should, where possible, be minimised via operating procedures in line with Flexible Use of Airspace principles

***Table 1** - Final technical, safety, environmental and operational design principles for ACP-2019-58, Llanbedr Danger Area (DA)*

2.3. Design options

The design options have been promulgated as Danger Areas (DA), rather than as Radio or Transponder Mandatory Zones (RMZ/TMZ) in order to be compliant with CAA CAP722 Unmanned Aircraft System Operations in UK Airspace – Guidance & Policy. CAP722 states that “Unless able to comply with the current requirements of the Air Navigation Order (ANO), including the Rules of the Air, Unmanned Aircraft System (UAS/drone) flights which are operated beyond the visual line of sight (BVLOS) of the remote pilot are required to be contained within segregated airspace. The UK uses DAs as the primary method of airspace segregation for UAS operations”.

The design options have been developed in light of the feedback received from stakeholders and interested parties in relation to the Stage 1B Design Principles, but also taking into account those comments relating to the technical definition of the proposed airspace change that were received from aviation stakeholders who already have a degree of familiarity with the Temporary Danger Area (TDA)[8] and the second of our airspace change proposals that relates to provision of an Air Traffic Zone (ATZ). There were also a few neutral responses to the design principles that raised issues/questions relating to two principle factors: (*i*) the impact of segregation on the flexible use of airspace (FUA) for other aviation operators, and (*ii*) the potential noise/general nuisance impact on non-aviation leisure activities in Snowdonia National Park. We have also sought to address these issues in the design options.

With regard FUA and its application to the Llanbedr Danger Area, the key requirement is stated in CAP740, Appendix A (UK Flexible Use of Airspace Strategy), Paragraph 7b:

- *Minimise airspace segregation by activating airspace volumes based on need rather than routine activation through set times defined in the AIP11. Where possible the routine activation should be by Notice to Airmen (NOTAM) to facilitate Strategic Airspace Management.*

This is reflected explicitly in Design Principle #3 and drove the requirement to identify multiple DA airspace segments that will allow us to both minimise time and volume of segregation. In response to this requirement we have identified an Area A in the immediate vicinity of the aerodrome that is common to all design options. Area A has the same dimension as an ATZ - a standard and well understood airspace safety management feature – and an area that reflects a minimum volume for anticipated DA activities. This will also allow the DA and ATZ (assuming successful conclusion of ACP-2020-02) to be managed in a consistent fashion.

As far as possible, beyond Area A, the shape of the DA has been designed to be easy to interpret and implement and the size has been designed to accommodate a range of different novel aerospace systems, examples of which are illustrated in Figure 3.

The combination of a segregated area for RDT&E activities local to Llanbedr Aerodrome (Design Principle #1) and a corridor connecting that area to the existing D201 Cardigan Bay Danger Area (Design Principle #2) means that the Llanbedr DA will always have a natural “T” or “keyhole” shape, both angled to the south-west. It doesn’t make sense for the corridor to be anything other than a rectangular/cuboid feature and we have chosen to adopt a circular/cylindrical format for the area local to the Aerodrome to be consistent with expansion of the ATZ volume, but also to maximise internal area/volume whilst minimising the segregated perimeter as far as possible. This is also consistent with FUA principles of minimisation, easy to interpret and implement, and avoids awkward corners that are difficult to navigate around.

With regard size, we received feedback from existing and potential users of the DA that it would be useful to be able to transit 10km to 20km to conduct short-medium range testing of aircraft systems (particularly ground-to-air communications), to have sufficient altitude for testing of drone stall and spin characteristics and small-scale rocketry and to have a range of geographic features for operational testing. Equally we had requests from other airspace users to allow transit over the top of the DA, and/or to be able to pass along the coast to the west of the aerodrome if the DA is activated over land, and/or to be able to pass over the coastal lowland to the east if the DA is activated over water. Non-aviation stakeholders also wished to minimise the overland activation of the DA.

Reflecting the observations and comments captured above, SAC prepared two initial design options for the DA upon which we then requested further feedback and comment from the stakeholders and interested parties previously engaged on the Design Principles. These options are intended to reflect (1) a maximum extent for the DA, and (2) a maximum segregation/minimum extent for the DA, and that additional design options could be generated by combining elements of both options. The only option that has been discounted is promulgation of the TDA in an unaltered form.

[8] Comments at lines 23, 24, 32, 42, 47, 69 and 73 of Annex C to the Stage 1B Report

Details of the two options are set out in Sections 2.3.1 and 2.3.2 below and further assessment of these options against the design principles and additional stakeholder feedback is discussed in Section 2.4.

2.3.1. Airspace Design Option #1

Option #1 (Figure 4) describes a baseline for the permanent Danger Area (DA) airspace change based on the Temporary Danger Area (TDA) that was originally consulted on, approved and promulgated in 2014[6]. The TDA reflects the extant position under which SAC and others presently operate, either in part or whole, to support the research, development, test and evaluation (RDT&E) of novel aerospace systems on an as-and-when-required basis.

Option #1 takes the TDA definition and identifies an additional volume to reflect the proposed Aerodrome Traffic Zone (ATZ), the latter subject to the current second Airspace Change application ACP-2020-02. Four separate volumes of airspace are referenced under the same DA identity, but each take a separate suffix - *e.g.* Areas A to D:

- Area A: a cylinder of 2.5 nautical mile radius, centred on the main runway 17/35, from surface to 2000 feet altitude above mean sea level (AMSL) - *i.e.* coincident with the proposed Aerodrome Traffic Zone (ATZ).
- Area B: a cylinder of 5 nautical mile radius, centred on the main runway 17/35, from surface to 6000 feet altitude. Area B provides an extended area for inshore, coastal, lowland and mountain operational testing.
- Area C: a rectangle of 10 nautical mile width and 4.91 nautical mile length that extends from Areas A and B tangentially out toward Danger Area D201, from surface to 6000 feet altitude. Areas A, B and C collectively extend to approximately 10 nautical mile in length (measured from the centre of the main runway 17/35). Areas A+B+C combined provide an extended area for offshore/maritime operational testing.
- Area D: a rectangle of 10 nautical mile width and 4 nautical mile length that further extends Areas A+B+C to create either an extended straight-line testing route and / or a “bridge” into the existing Danger Area D201, from an altitude of 2000 feet up to 6000 feet. Access to D201 provides an ability for extended range/endurance/altitude testing. This will be managed via Letter of Agreement with QinetiQ/MOD. The 6000 feet upper altitude limit is defined so as to enable an engine out recovery without leaving segregated airspace in Area D for glide profiles <1000 feet per nautical mile.

2.3.2. Airspace Design Option #2

As a result of the two-way engagement process and in line with the resulting design principles (Table 1), the following Option #2 (Figure 5) is also put forward for the permanent Danger Area (DA) airspace change:

- Area A1: a cylinder of 2.5 nautical mile radius, centred on the main runway 17/35, from surface to 2000 feet altitude - *i.e.* coincident with the proposed Aerodrome Traffic Zone (ATZ), the subject of the current second Airspace Change application ACP-2020-02.
- Area A2: extends Area A1 from an altitude of 2000 feet up to 6000 feet.
- Area B1: a partial annulus of 2.5 nautical mile inner radius, 5 nautical mile outer radius, centred on the main runway 17/35, extending to the west and angled west/south-west, from surface to 2000 feet altitude. Areas A+B combined provide an extended area for inshore/coastal operational testing. The Area B/E division cuts north/south from the Area A/C intersect to maximise the coastal coverage of Area B whilst minimising the overland area. The Area B/F division is nominally aligned with the coastline, but offset from the coast by approximately 1 nautical mile to minimise the impact on any paragliding and hang-gliding activities in the vicinity of Harlech.
- Area B2: extends Area B1 from an altitude of 2000 feet up to 6000 feet.

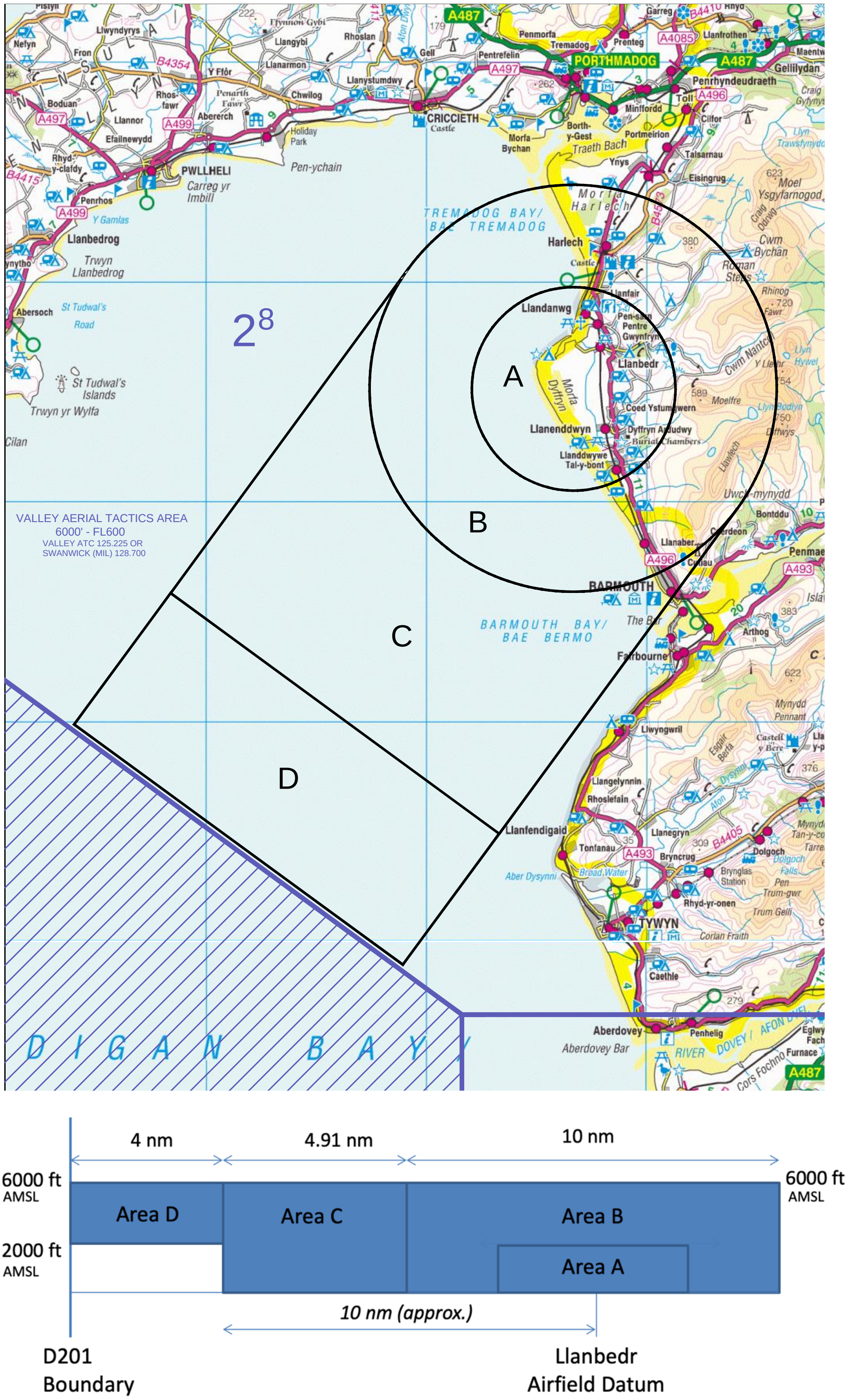

Figure 4 *– Draft airspace design Option #1 for ACP-2019-58, Llanbedr Danger Area (DA)*

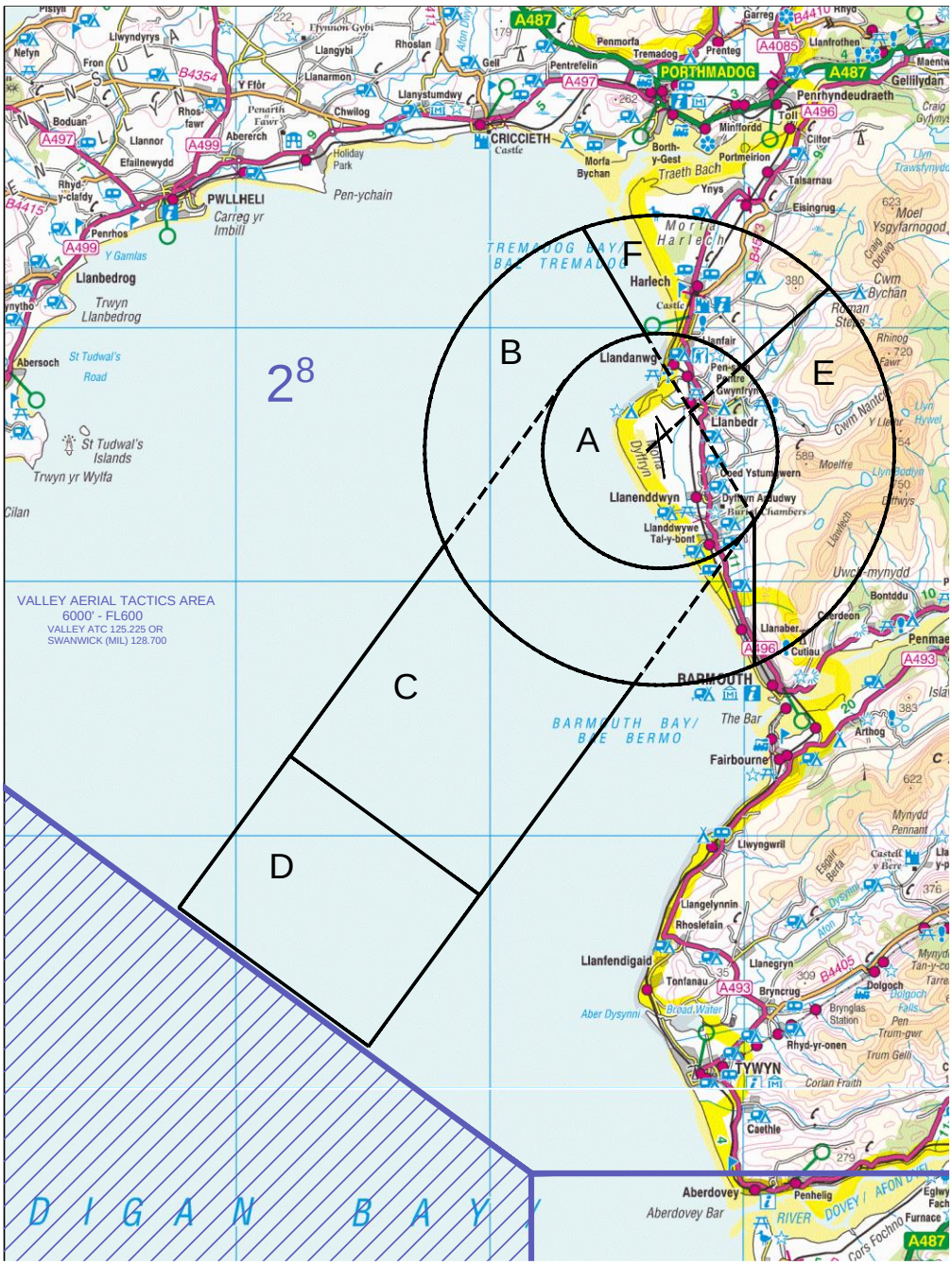

Figure 5 *– Draft airspace design Option #2 for ACP-2019-58, Llanbedr Danger Area (DA)*

- Area C1: a rectangle of 5 nautical mile width and 4.91 nautical mile length that extends from Area A tangentially out toward Danger Area D201. Area A and C1 collectively extend to approximately 10 nautical mile in length (measured from the centre of the main runway 17/35), from surface to 2000 feet altitude. Areas A+C combined provide an extended area for offshore/maritime operational testing.
- Area C2: extends Area C1 from an altitude of 2000 feet up to 6000 feet.
- *Area D1: it is proposed that this area remains outside the DA to maintain a "tunnel" from surface to 2000 feet for low-level air traffic transiting to / from RAF Valley as per current operations with the TDA.*
- Area D2: a rectangle of 5 nautical mile width and 4 nautical mile length that further extends Areas A+C to create either an extended straight-line testing route and / or a "bridge" into the existing Danger Area D201, from an altitude of 2000 feet up to 6000 feet. Access when required to D201 will provide an ability for extended range/endurance/altitude testing, which will be managed via Letter of Agreement with QinetiQ/MOD. The 6000 feet upper altitude limit is defined so as to enable an engine out recovery without leaving segregated airspace in Area D for glide profiles <1000 feet per nautical mile.
- *Area E1: it is proposed that this area remains outside of the DA to keep experimental aircraft clear of the Rhinog mountains.*
- Area E2: a partial annulus of 2.5 nautical mile inner radius, 5 nautical mile outer radius, centred on the main runway 17/35, extending to the east, from an altitude of 2000 feet up to 6000 feet. Areas A+E combined provide an extended area for upland/mountain operational testing. The Area E/F division is nominally aligned with the extended centreline from Runway 05/23 and represents a natural division between upland/mountain and coastal lowland environments, again seeking to minimise the impact on any paragliding and hang-gliding activities in the vicinity of Harlech.
- Area F1: a partial annulus of 2.5 nautical mile inner radius, 5 nautical mile outer radius, centred on the main runway 17/35, extending to the north, from surface to 2000 feet altitude. Areas A+F combined provide an extended area for coastal/lowland operational testing
- Area F2: extends Area F1 from an altitude of 2000 feet up to 6000 feet.

2.3.3. Air Traffic Management principles for Design Options #1 and #2

The following outline Air Traffic Management principles are expected to apply for both Design Options #1 and #2:

- None of the areas of the proposed DA will be permanently active and will only be activated by NOTAM when novel aerospace flying activities are due to take place;
- A FISO service will be provided by Snowdonia Aerospace from take-off to landing for all novel aerospace operations within the proposed DA. The core FIS will be augmented with an Unmanned Traffic Management (UTM) system with a minimum ADS-B Out monitoring capability. Llanbedr FIS will also provide a Danger Area Activity Information Service (DAAIS) for all airspace users in the vicinity of the DA;
- It is anticipated that the novel aerospace system will be equipped with an ADS-B Out transponder as a minimum electronic conspicuity capability when operating outside of Area A for both Options #1 and #2;
- QinetiQ/MOD Aberporth Air Traffic Control (ATC) will be notified of all novel aerospace operations and their services will be engaged via Letter of Agreement (LOA) for operations that intend to transit through Area D for both Options #1 and #2 to operate in D201 or further into D202;

- The novel aerospace system crew is responsible for monitoring flight systems and communicating directly with Llanbedr FIS or MOD Aberporth ATC;
- In addition, the novel aerospace system crew is to ensure that the aircraft remains within the confines of the segregated airspace during both normal operation and in the event of any routine emergency. The novel aerospace system will be expected to "geo-fence" and maintain a buffer to prevent inadvertent departure from the DA. This, and other safety-related issues, will need to be addressed within the Operating Safety Case (OSC) for the novel aerospace system and will be subject to review and approval by the CAA before operation within the DA will be allowed.

2.4. Design principle evaluation

2.4.1. Design option correlation with design principles

Commensurate with Design Principles #1 and #2, the horizontal dimensions of each Design Option have been set to satisfy the following requirements for a range of different novel aerospace systems:

i. System testing: the ability to conduct short-medium range testing (10km to 20km) of aircraft systems, particularly ground-to-air communications;

ii. Extended system testing: the ability to transit to D201 to conducted extended range, altitude and/or endurance testing of aircraft systems;

iii. System-of-systems testing: the ability to conduct systems-of-systems testing supporting wider airspace integration – *e.g.* Unmanned Traffic Management (UTM), detect-and-avoid *etc*.

iv. Operational testing: the ability to conduct testing in a range of operationally relevant environments – *e.g.* maritime/offshore, inshore/coastal, coastal/lowland, and upland/mountain.

However, in both cases the DA has been broken into a number of sub-areas as per Design Principle #3. With regard Design Option #1, the DA can be promulgated either as Area A, A+B, A+B+C or A+B+C+D. For Design Option #2 there are multiple possible combinations, the most likely being: A, A+B, A+C, A+C+D, A+E, A+F, A+B+E+F. In-line with Flexible Use of Airspace principles, none of the areas of the proposed DA will be permanently active and will only be activated by NOTAM when RDT&E flying activities are due to take place.

With regard the vertical dimensions, RAF Valley aircraft operate on the Regional Pressure Setting (RPS) when they are conducting their medium level activity and OC STANAT has confirmed that expressing the upper height as XXXX ft as opposed to Flight Level (FL) XX will make it easier for RAF Valley to safely deconflict. The 6000 feet upper altitude limit in Area D was defined previously so as to enable an engine out recovery without leaving segregated airspace for glide profiles <1000 feet per nautical mile. A similar 6000 feet upper altitude limit in the vicinity of Llanbedr Aerodrome – *i.e.* for Areas A and B – has also been identified by potential DA users as being valuable for testing of drone stall and spin characteristics and small-scale rocketry. Design Option #2 also contains an explicit split in altitude – *e.g.* A1 from surface to 2000ft, A2 from 2000ft to 6000ft *etc*. – to again adhere to Flexible Use of Airspace principles as much as possible. With Option #1 the upper altitude would be determined on a case-by-case basis (up to a maximum of 6000ft) and implemented as part of the activation NOTAM.

Making Area A coincident with the proposed Aerodrome Traffic Zone (ATZ) helps satisfy Design Principle #4, as does ensuring consistent operation of the Flight Information Service (FIS) in line with Design Principle #6.

Furthermore, the combination of the ATZ (assuming successful conclusion of ACP-2020-02), the FIS service, the ATM principles outlined in Section 2.3.3 and the explicit horizontal and vertical segmentation of the Danger Area in Option #2, will allow other air traffic to safely transit over the DA (above 2000ft) and past the DA to the west or east depending on which areas have been activated. This will minimise the impact on military and other general aviation and satisfies Design Principles #9 and #10. The same capability to transit over the DA will also exist with Option #1 as the full 6000ft altitude will only be activated if required.

The horizontal and vertical segmentation of the Danger Area will also allow us to minimise the impact on the environment, Snowdonia National Park and associated leisure activities in line with Design Principles #7 and #8.

Design Principle #5 is inherent in all operations at Llanbedr Aerodrome.

2.4.2. Stakeholder feedback on the design options

We received 32 responses to the request for stakeholder feedback on the design options (detailed in Appendix 1). Of these 32 responses, 3 (9%) expressed a preference for Option #1, 9 (28%) expressed a preference for Option #2, 6 (19%) expressed no preference, 2 (6%) opposed both options, and 12 (38%) felt unable to comment pending further clarification (mostly non-aviation).

The main voices of opposition came from a local Harlech landowner and also the Harlech hang-gliding club who felt that both Danger Area options would "put an end to hang-gliding and paragliding at Harlech". SAC is sympathetic to the needs of local residents and airspace users and we believe a mutually satisfactory compromise is very easily achievable. As noted earlier, the shape of the DA has been designed to be simple to interpret and implement and hence, whilst specific geographic locations may nominally sit within the DA, operating procedures can be put in place to ensure any novel aerospace flying activities are constrained to non-sensitive areas or managed via Letters of Agreement (LOA).

It should also be noted that the Temporary Danger Area (effectively Design Option #1) has been activated on a number of occasions over the past 5 years without incident, concern or impact on the hang-gliding and paragliding or any other local aviation or non-aviation activities.

Regardless of the design option, the number of days of DA sub-area activation per year is likely to provide further mitigation of the issues raised and to Design Principles #7 to #10 in general (environment and flexible use of airspace). Utilisation, and other safety, operational, environmental and economic considerations, will be addressed in more detail as part of the analysis supporting the Stage 2B Options Appraisal, which will also pick up the potential noise/nuisance issues raised in the "unable to comment" responses.

With regard Option #1 versus Option #2, Option #1 was considered to be easier to interpret and to provide greater flexibility for operators using the DA, whereas Option #2 was considered to be more complex but offered more advantages in terms of flexible use of airspace. One response also highlighted the potential for combining elements of both options – *e.g.* Areas A and B from Option #1 and Areas C and D from Option #2. Multiple such combinations could be identified, but SAC considers the two current options to best represent the distinct alternatives.

A number of further issues were raised by MOD who operate Hawk T2 and Texan T1 aircraft from RAF Valley throughout the North-West Military Training Area (NWMTA). The Texans will routinely operate to a base level of 4000ft and MOD would require a LOA to ensure any activation above 4000ft is deconflicted with Valley operations. Again, SAC is sympathetic to the needs of other airspace users and we believe a mutually satisfactory compromise is very easily achievable via LOA and that the number of days of DA activation per year requiring operations at altitudes greater than 3000ft is likely to provide further mitigation.

A further LOA will be needed with MOD/QinetiQ in order to manage any transition from the Llanbedr DA into the D201 Cardigan Bay Range via Area D, but we believe the outline Air Traffic Management principles described in Section 2.3.3 provide the basis for discussions that will allow this to be concluded in a timely fashion.

As a result of the additional stakeholder feedback around the design options, there is obviously a need for continued engagement to further refine the details and operating procedures that will inform the LOAs. We will actively follow up with the individual stakeholders in due course. We must also consider how engagement/consultation materials are developed to suit a range of audiences, such as how technical information will be communicated in an accessible way to non-aviation stakeholders.

On the basis of the feedback received, but also recognising the ongoing engagement actions identified above, we believe the design principles and design options that have been developed to date are fundamentally sound and suitable for taking forward into the next stages of the airspace change process.

A full mapping of individual stakeholder feedback comments to the Design Option decisions and conclusions discussed above can be found in Appendix A and the compendium of original stakeholder correspondence can be found in Annex 1.

3. Conclusions and Next Steps

3.1. Conclusions

The following conclusions have been drawn from the "Stage 2A Options Development" element of the Snowdonia Aerospace LLP submission for an Airspace Change Proposal, Reference: ACP-2019-58, Llanbedr Danger Area, under the Civil Aviation Authority (CAA) CAP1616 Airspace Change Process:

1. SAC has prepared two design options for the Danger Area (DA) and requested further feedback and comment from the stakeholders and interested parties previously engaged on the Design Principles. A side-by-side comparison of the design options is shown in Figure 1a and 1b;
2. In both cases, the design provides an area of segregated airspace local to Llanbedr Aerodrome for the research, development, test and evaluation (RDT&E) of novel aerospace systems and an air corridor that will link Llanbedr Aerodrome with the existing Danger Area D201;
3. Option #1 describes a baseline for the DA airspace change based on the Temporary Danger Area (TDA) that was originally consulted on, approved and promulgated in 2014. Option #2 is further refinement based on feedback received as part of the two-way engagement process on the Design Principles;
4. As far as possible, the shape of both DA options has been designed to be easy to interpret and implement and the size has been designed to accommodate a range of different novel aerospace systems. Outline Air Traffic Management principles have also been identified for both options;
5. Option #1 was considered to be easier to interpret and to provide greater flexibility for operators using the DA, whereas Option #2 was considered to be more complex but offered more advantages in terms of flexible use of airspace;
6. Other local airspace users, both military and general aviation, and a local landowner identified possible potential conflicts, but SAC is sympathetic to the needs of other stakeholders and we believe a mutually satisfactory compromise is very easily achievable. An action was identified for continued engagement to further refine the details and operating procedures that will inform the Letters of Agreement with these other stakeholders;
7. For both design options, the number of days of DA sub-area activation per year is likely to provide further mitigation of airspace access issues. Utilisation, and other safety, operational, environmental and economic considerations, will be addressed in more detail as part of the analysis supporting the Stage 2B Options Appraisal;
8. Some stakeholders (mostly non-aviation) felt unable to comment pending further clarification. We must also consider how future engagement/consultation materials are developed to suit a range of audiences, such as how technical information will be communicated in an accessible way to non-aviation stakeholders.
9. On the basis of the feedback received, but also recognising the ongoing engagement actions identified in (6) and (8) above, we believe the Design Principles and Design Options that have been developed to date are fundamentally sound and suitable for taking forward into the next stages of the airspace change process.

3.2. Next steps

The design options stated here together with the previous design principles from Stage 1B will be used to inform the Design Options Appraisal (Stage 2B). More generally, the conclusions will also be used to help inform the Consultation Preparation (Stage 3A).

As an immediate follow-on activity, SAC will also write back to all respondents with a thank you letter and seek to identify opportunities for further engagement/consultation that will address the action items described in (6) and (8) above.

Appendix A – Mapping of Stakeholder feedback to Design Option decisions and conclusions

No (a)	Stakeholder Responses (b)	Source (c)	Broad Design Option Themes (d)	Design Option # (e)	Decision / conclusion applied to Design Option(s) as a result of feedback (f)
1	The use of the Llanbedr datum could be understood to be height rather than altitude?	Email (see Annex 1)	Height datum / Regional Pressure Setting (RPS) / transition altitude	1 & 2	Discussion: The top height is currently stated as 6000ft. The matter was raised with RAF Valley OC STANAT who confirmed use of Regional Pressure Setting (RPS) when they are conducting their medium level activity and hence a top height of XXXX ft would make it easier for them to operate over the top of rather than if we had FL XX Conclusion: The current Design Options satisfactorily address this point in full.
2	in the initial brief where it seemed as though the majority of the DA would be out to sea. As the designs currently stand, I am completely opposed to Option 1, and would only be supportive of Option 2 if Area F were removed from the DA altogether.	Email (see Annex 1)	Over-land operation	1 & 2	Discussion: The shape of the Danger Area (DA) has been designed to be simple to interpret and implement. This means that whilst specific geographic locations may nominally sit within the DA, operating procedures will be put in place to ensure any drone flying activities are kept clear of sensitive areas. We have made a forecast of future business and anticipate that we will need to activate the DA on approximately 100 days per year, but that the vast majority of operations (approximately 90%) will be over the aerodrome or out over the sea. We believe the combination of limited over-land drone operations (less than 10 days a year), low noise footprint, operating procedures, geo-fencing and CAA approval of the safety case will assuage stakeholder concerns. Conclusion: The current Design Options are considered to be fully compatible with local community wishes whilst also meeting other

					stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA). *Note, a follow-up letter has been sent to this stakeholder to expand on the discussion of their comments.*
3	The proposal needs to ensure all relevant planning permissions/lawful use certificates have been sought/are in place	Email (see Annex 1)	Environmental protection	1 & 2	Discussion: We have a Certificate of Lawfulness for the site as a whole under Consent No. NP5/62/LU371 for the use of the site for the research and development for the testing, evaluation and development of Unmanned Air Vehicles. Conclusion: The current Design Options satisfactorily address this point in full.
4	All relevant Public Protection requirements must be met (in terms of noise levels *etc*), and planning issues discussed with Snowdonia National Park Authority	Email (see Annex 1)	Environmental protection	1 & 2	As per line item (3)
5	Public Protection issues should be discussed in detail with the relevant Gwynedd Council officers	Email (see Annex 1)	Safety	1 & 2	The Aerodrome safety management plan will be reviewed and updated accordingly. In addition, all flight operations in the DA will be subject to a separate safety case to be reviewed by the CAA and additional action will be taken if required. Any Public Protection issues will be shared with Gwynedd Council Conclusion: The current Design Options satisfactorily address this point in full.
6	We should be trying to keep as much G classified airspace as possible. Reduced width of Area C-D corridor in Option #2 preferred to Option #1	Email (see Annex 1)	Flexible Use of Airspace (FUA)	1 & 2	Discussion: Noted preference for Option #2 Conclusion: The current Design Options satisfactorily address this point in full.
7	Although greater segregation increases complexity it also assists in terms of	Email (see Annex 1)	FUA	1 & 2	Discussion: Noted preference for Option #2

	flexibility and this is a design aim I am in favour of.				Conclusion: The current Design Options satisfactorily address this point in full.
8	I would also suggest that F1 is also not included or not used within the danger area as *[this]* is the most built up area containing Llandanwg and Harlech.	Email (see Annex 1)	Over-land operation	2	Discussion: As per line item (2)
9	I am concerned that if the danger area is active for significant periods of time it will basically restrict GA flying	Email (see Annex 1)	FUA, impact on General Aviation users	1 & 2	Discussion: We have made a forecast of future business and anticipate that we will need to activate the DA on approximately 100 days per year, but that the vast majority of operations (approximately 90%) will be over the aerodrome or out over the sea. In addition, we believe the segmentation of the DA (particularly with Option #2) will allow other airspace users to transit over the top of the DA, and/or to be able to pass along the coast to the west of the aerodrome if the DA is activated over land, and/or to be able to pass over the coastal lowland to the east if the DA is activated over water. Letters of Agreement (LOA) will be negotiated with other aviation stakeholders. Conclusion: The current Design Options are considered to be fully compatible with GA operations whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).
10	Design option #2 would appear to offer the most proportionate and flexible airspace construct and should be the preferred option.	Email (see Annex 1)	FUA	1 & 2	As per line item (9)
11	I believe that the extra flexibility *[Option #2]* provides will be very useful as it will allow you to only activate the volume of airspace that is required for any particular operation and leave the remaining volumes available for use by other traffic.	Email (see Annex 1)	FUA, impact on General Aviation users	1 & 2	As per line item (9)

12	The effect on GA and other traffic is considered just from an operation perspective under the design principles. The changes should also be considered from a safety perspective as traffic being forced to avoid active areas should not be forced into bottlenecks or over high ground.	Email (see Annex 1)	FUA, impact on General Aviation users, safety	1 & 2	Discussion: As per line item (9). The Aerodrome safety management plan will be reviewed and updated accordingly. In addition, all flight operations in the DA will be subject to a separate safety case to be reviewed by the CAA and additional action will be taken if required. Conclusion: The current Design Options are considered to be fully compatible with GA operations whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).
13	Will the danger area proposed have an impact on boating activities in the area on the maps as its transitioned a lot by both recreational boaters and also used for commercial fishing, as the inner area is surface start etc, as Aberporth allows no one in theirs when firing is going ahead	Email (see Annex 1)	Over-water operation, Safety	1 & 2	Discussion: In general, it is not expected that there will be any release of payload or any other over-water activity that would impact on boating operations. All flight operations in the DA will be subject to a separate safety case to be reviewed by the CAA and additional action will be taken if required. Conclusion: The current Design Options satisfactorily address this point.
14	I prefer option one on the basis that it is easier to assimilate, reducing cockpit workload. Provided that flexible use of airspace principals translates to specific periods throughout the day rather than having the whole day NOTAMed.	Email (see Annex 1)	FUA, impact on General Aviation users	1	Discussion: Noted preference for Option #1. The DA will be activated by NOTAM only when required and we will seek to minimise both time and volume of segregation. Conclusion: The current Design Options satisfactorily address this point in full.
15	Option two. I have concerns regarding low level UAV operations in areas A-F. *[Option #2 creates a further sub-division below 2000ft]*	Email (see Annex 1)	Safety	2	Discussion: We expect twice as many flights below 2000ft as above because the effect to be delivered by small/light drones (our typical customers) is inherently low-level in nature. All flight operations in the DA will be subject to a separate safety case to be reviewed by the CAA and additional action will be taken if required.

					Conclusion: The current Design Options satisfactorily address this point in full.
16	Our main concern is the draft proposal for an area of inland airspace over one of the most tranquil parts of the National Park (Area E) to be used as 'an extended area for upland/mountain operational testing'. We request that draft Danger Area proposals are reconsidered in order to avoid significant harm to public enjoyment of the special qualities of this part of the National Park.	Email (see Annex 1)	Over-land operation, environmental protection	1 & 2	Discussion: The shape of the Danger Area (DA) has been designed to be simple to interpret and implement. This means that whilst specific geographic locations may nominally sit within the DA, operating procedures will be put in place to ensure any drone flying activities are kept clear of sensitive areas. We have made a forecast of future business and anticipate that we will need to activate the DA on approximately 100 days per year, but that the vast majority of operations (approximately 90%) will be over the aerodrome or out over the sea. We believe the combination of limited over-land drone operations (less than 10 days a year), low noise footprint, operating procedures, geo-fencing and CAA approval of the safety case will assuage stakeholder concerns. Furthermore, we will seek to negotiate Letters of Agreement (LOA) with key stakeholders regarding areas, hours of operation *etc*. Conclusion: The current Design Options are considered to be fully compatible with local community wishes whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).
17	Both designs only leave a small portion of Glass G airspace (4nm wide) to transit underneath the proposed DA.	Email (see Annex 1)	Safety	1 & 2	Discussion: The 4nm "tunnel" is a feature of the Temporary Danger Area (TDA) that was arrived at after previous consultation with stakeholders, and we have decided to promulgate the same design feature as part of the permanent Danger Area design options, but we remain open to considering alternative suggestions and would welcome

					supporting evidence to help consolidate the design. Conclusion: The current Design Options satisfactorily address this point in full.
18	If the DA is active, D201 trials might be restricted as NATS Aberporth lose the ability to exit the Danger Area in the NE portion of D201J whilst conducting profile set-ups on a South Westerly run in.	Email (see Annex 1)	FUA, impact on military aviation users	1 & 2	Discussion: We have made a forecast of future business and anticipate that we will need to activate the Danger Area on approximately 100 days per year, but that Areas C and D that might impact on the north-east portion of D201J will only need to be activated approximately 33% of the time – i.e. once every 10 days or so. We also anticipate that operations in all areas of the proposed Llanbedr DA will only exceed 2000ft altitude on a similar number of days. We therefore believe there is a great deal of scope for test activities within the Llanbedr DA and D201 to safely co-exist without impact on either party. Conclusion: The current Design Options are considered to be fully compatible with D201 operations whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).
19	The design calls for a maximum vertical extent of Alt 6000ft, but the Transition Altitude in the area is 3000ft. Normally, only where a DA is designed to support firing of munitions is the vertical extent represented as an Alt. For everything else, it is normally a Flight Level if above the Transition Altitude.	Email (see Annex 1)	Height datum / Regional Pressure Setting (RPS) / transition altitude	1 & 2	As per line item (1)
20	Airspace Containment: (a) the purpose of this DA is to segregate the activity from other airspace users but fails to mention how each design does this	Email (see Annex 1)	Safety	1 & 2	Discussion: With regard to airspace segregation, none of the areas of the proposed Llanbedr DA will be permanently active and will only be activated by NOTAM when required (as is also the

					case with D201). We work actively with other local airspace users – e.g. via the regular RAF Valley Airspace Users Symposium – to raise awareness of Danger Area activities at Llanbedr. A Flight Information Service (FIS) will be provided from take-off to landing for all operations within the proposed DA. Llanbedr FIS will also provide a Danger Area Activity Information Service (DAAIS) for all airspace users in the vicinity of the DA. Containing drones within the DA is the responsibility of the individual drone operator, albeit with advice and support from the DA sponsor. The Danger Area is only one element of a multi-faceted Operating Safety Case (OSC) that any drone operator will need to submit to the CAA for approval before any flight within the DA will be allowed. Conclusion: The current Design Options satisfactorily address this point in full.
21	Airspace Containment: (b) the lateral dimensions within each design does not explain why it has to be that wide or that altitude.	Email (see Annex 1)	Safety	1 & 2	Discussion: The lateral and vertical dimensions of both Danger Area (DA) options are needed to accommodate the flight test requirements of a range of different novel aerospace systems and the justification for each has been detailed in Section 2.3 of this report. Conclusion: The current Design Options satisfactorily address this point in full.
22	If the DA is being used for containment, then (*i*) what navigational accuracy is associated to these nominal routes, (*ii*) how far are they from the edge of the DA, and (*iii*) why is this considered the minimum necessary to protect others?	Email (see Annex 1)	Safety	1 & 2	Discussion: The OSC will describe where, when and how the drone will operate and will be expected to show that all built-up/sensitive areas will be avoided and that appropriate geo-fencing mechanisms are built into the autopilot to ensure that not only is this achieved, but that the drone will be constrained within the DA at all times. A buffer of at least 500m to the edge of the DA is nominally advised, but this will vary depending

					upon the speed of the drone and the latency of the command and control loop. The drone will also be expected to have a geolocation transponder that will allow the drone operator, the Llanbedr Aerodrome Flight Information Service (FIS) Officer and any other suitably equipped air traffic to know where the drone is at all times. Conclusion: The current Design Options satisfactorily address this point in full.
23	To date there is no LOA in place for NATS Aberporth to agree transfer of control if the UAV platforms are entering the D201 complex. NATS Aberporth would expect it to be at the boundary of D201J.	Email (see Annex 1)	Safety, impact on military aviation users	1 & 2	Discussion: We have had discussions with the Danger Area Airspace Manager, the QinetiQ Aberporth team and also with the QinetiQ Managing Director for Global Test and Evaluation to discuss multiple aspects of coordination for activities in D201 and the Llanbedr DA. With regard air traffic management, we also see the transfer of control being at the boundary of D201J if the drone is entering the D201 complex and that the details will be formalised within a LOA. Conclusion: The current Design Options are considered to be fully compatible with D201 operations whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA). *Note, a follow-up letter has been sent to this stakeholder to expand on the discussion of their comments (line items 18 to 23)*
24	Option 1 offers the greatest operational flexibility to afford SAC / Spaceport Snowdonia the potential to become the UK's leading test and launch facility for the advancement of Space and	Email (see Annex 1)	RDT&E objectives	1	Discussion: Noted preference for Option #1. A 6000ft upper height limit has been identified to enable small-scale rocketry over the aerodrome and provide a more flexible transit corridor for larger vehicles to gain access to D201 for other launch activities

	aerospace technology, a vital asset for Wales and the UK as a whole.				Conclusion: The current Design Options satisfactorily address this point in full.
25	In considering the 2 design options put forward by Llanbedr, we do not object to either providing there is a robust mechanism for the notification of activation and that there is an ability to transit such airspace, of course subject to novel aerospace systems activity. In that regard, the provision of a DAAIS or DACS is considered essential. However, our preference would be for Design Option #2 which shows greater use of FUA whilst providing the required segregation for the established activity.	Email (see Annex 1)	FUA, safety	1 & 2	Discussion: Noted preference for Option #2. Llanbedr FIS will provide a Danger Area Activity Information Service (DAAIS) for all airspace users in the vicinity of the DA. Conclusion: The current Design Options satisfactorily address this point in full.
26	*[Option #1]* is considered the proposal which would be simplest to understand from a GA aviation perspective in terms of both horizontal and vertical extent. As illustrated, it presents the least potential for inadvertent transitions / incursions of active airspace.	Email (see Annex 1)	Safety, impact on General Aviation users	1 & 2	Discussion: Noted preference for Option #1. Conclusion: The current Design Options satisfactorily address this point in full.
27	As presented in Option 1, the transit corridor out to the Aberporth Danger Area, D201 is considered to be wider than necessary. Whilst this is favourable from purely a T&E flight trials perspective for operations of UAS over a larger sea area, if the corridor exists merely as a transit corridor to permit access to the existing D201 Aberporth Danger Area, then an alternative option could be considered to reduce the width of the corridor. This could be similar to that … already proposed as part of your Option 2.	Email (see Annex 1)	FUA, RDT&E objectives	1 & 2	Discussion: Option #1 is intended to reflect a maximum extent for the DA for RDT&E purposes, Option #2 reflects a maximum segregation/minimum extent for the DA, and additional design options could be generated by combining elements of both options. Conclusion: The current Design Options satisfactorily address this point in full.
28	Whilst *[Option #2]* offers the greater flexibility and … is considered the	Email (see Annex 1)	FUA, safety, impact on General Aviation users	1 & 2	As per line item (27).

	favourable option, it is clearly more complex from both a horizontal and vertical perspective, which may lead to misinterpretation by the GA community, which in turn could lead to an increased number of inadvertent airspace incursions. It could possibly be simplified by combining the 2x vertical constraints (layers 1 & 2) into a single layer but we accept that this will reduce the "flexible use of airspace" criteria that is being sought.				
29	This area (*[Option #2]* F1 and F2) affects two established *[hang-gliding and paragliding]* take-off and soaring areas at Harlech cliffs and Harlech Merthyr Farm.	Email (see Annex 1)	Over-land operation, FUA, impact on General Aviation users	2	Discussion: The shape of the Danger Area (DA) has been designed to be simple to interpret and implement. This means that whilst specific geographic locations may nominally sit within the DA, operating procedures will be put in place to ensure any drone flying activities are kept clear of sensitive areas. We have made a forecast of future business and anticipate that we will need to activate the DA on approximately 100 days per year, but that the vast majority of operations (approximately 90%) will be over the aerodrome or out over the sea. We believe the combination of limited over-land drone operations (less than 10 days a year), and a Letter of Agreement (LOA) regarding mutual operations will assuage stakeholder concerns. Conclusion: The current Design Options are considered to be fully compatible with hang-gliding and paragliding operations whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).

					Note, a follow-up letter has been sent to this stakeholder to expand on the discussion of their comments (line items 29 and 30).
30	The East area of option 1 DA and areas E1/E2 of option 2 would prevent gliding in the Rhinogiau as the current proposal of area E1 would prevent Paragliders and hang gliders going above 2,000' ASL.	Email (see Annex 1)	Over-land operation, FUA, impact on General Aviation users	1 & 2	As per line item (30)
31	I support the application and the proposed development of the airspace and believe it will be very useful for *[RDT&E]* testing and that it also observes the Flexible Use of Airspace Principles. I would suggest that Option 1 is the more practicable due to the complexity of the layout of Option 2 - specifically areas E and F and their exact boundaries.	Email (see Annex 1)	FUA, RDT&E objectives	1 & 2	Discussion: Noted preference for Option #1. Conclusion: The current Design Options satisfactorily address this point in full.
32	I have no detailed comments. I note the allowing general points (*i*) the need to ensure that Gwynedd Council's emergency planning officer is aware of the proposal and has opportunity to comment on it, (*ii*) the need to minimise any unnecessary interference on local people (*e.g.* sound *etc*.)	Email (see Annex 1)	Safety, environmental impact	1 & 2	Discussion: As per line items (4) and (5). Furthermore, it is our intent that any impact on the environment and associated leisure activities should, where possible, be minimised via operating procedures and should, where possible, take account of any local development projects or noise sensitive areas that are highlighted as a result of stakeholder engagement Conclusion: The current Design Options are considered to be fully compatible with local community wishes whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).
33	Option two would appear to give greater flexibility meeting the needs of both the UAVs and other airfield users.	Email (see Annex 1)	FUA, RDT&E objectives	1 & 2	Discussion: Noted preference for Option #2. Conclusion: The current Design Options satisfactorily address this point in full.

34	A key consideration would be to avoid new airspace concentrating air traffic in or towards environmentally sensitive sites either as a result of traffic operating inside this area or from the traffic which has to avoid this new airspace. In this regard we observe no significant differences between the two designs.	Email (see Annex 1)	Environmental impact	1 & 2	Discussion: The shape of the Danger Area (DA) has been designed to be simple to interpret and implement. This means that whilst specific geographic locations may nominally sit within the DA, operating procedures will be put in place to ensure any drone flying activities are kept clear of sensitive areas. We have made a forecast of future business and anticipate that we will need to activate the DA on approximately 100 days per year, but that the vast majority of operations (approximately 90%) will be over the aerodrome or out over the sea. Furthermore, it is our intent that any impact on the environment and associated leisure activities should, where possible, be minimised via operating procedures and should, where possible, take account of any local development projects or noise sensitive areas that are highlighted as a result of stakeholder engagement Conclusion: The current Design Options are considered to be fully compatible with environmental sensitivities whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).
35	It has also been noted that the statements covering environmental clauses are quite loose – we would be interested to see these firmed up and more detailed. The use of “where possible” could be a cause for concern when we are considering the environmental significance of the Snowdonia National Park so further information to understand the potential impact here would be favourable	Email (see Annex 1)	Environmental impact	1 & 2	Discussion: Noted and we anticipate further detail will be negotiated as part of the Letters of Agreement with key stakeholders. Conclusion: The current Design Options are considered to be fully compatible with environmental sensitivities whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).

36	We are primarily concerned with the Sustainable Management of Natural Resources. As such we need to consider the likely impact your proposals would have on the Sites of Special Scientific Interest; Special Conservation Area and Special Protection Area as well as any section 7 Habitats & Species. Whilst we undertake the consenting of activities within the boundary of an SSSI for activities listed on the Operations Likely to Damage the Special Interests. We are not certain of the lead Permit for your proposal and are uncertain as to who would be the competent authority to undertake the Habitat Regulation assessment associated with any permit.	Email (see Annex 1)	Environmental impact	1 & 2	As per line items (3), (34) and (35)
37	I notice that your draft design principles have, under the operational category, "Impact on military aircraft training should, where possible, be minimised via operating procedures in line with Flexible Use of Airspace (FUA) principles". How have you used this DP to inform your airspace options? Furthermore, the MOD would hope that your design principles as presented are not shown in priority order. Do you have a priority?	Email (see Annex 1)	FUA, Impact on military aviation users	1 & 2	Discussion: This design principle informed our options development and appraisal in the following ways: (*i*) the identification of multiple sub-areas so that we only segregate the minimum amount of airspace required at any given time, (*ii*) the need to update Aerodrome Manual to reflect the change in airspace status and agreed operating procedures, particularly with regard to Notice to Airmen (NOTAM) for activating the DA, and (*iii*) the need to formalize procedures for coordination with other airspace users via Letters of Agreement (LOA). The design principles are listed by category in order to aid ease of interpretation and we have given equal weight to technical, safety, environmental and operational principles. There is no requirement within CAP1616 to list the design principles in priority order and no criticalities have yet been raised that would require a priority to be identified, but were that to be the case we would do so in discussion with stakeholders.

					Conclusion: The current Design Options satisfactorily address this point in full.
38	Noting the design principle for the MOD. How do you intend on ensuring FUA in the best possible way? Noting that they will be activated on an "as-and-when-required basis", how often do you propose the areas are activated? And by what means do you propose the airspace will be activated? How will you hand airspace back if the UAS fails to get airborne? The MOD would require an LOA with RAF Valley to ensure that peak Valley operational times are avoided. The MOD would also prefer a DACS over a DAAIS. Furthermore, with the limitations of a FISO, how would you propose to ensure that a UAS remains within the confines of the DA? What is your containment policy?	Email (see Annex 1)	FUA, Impact on military aviation users, safety	1 & 2	As per line items (20) to (22) inclusive
39	Noting that both airspace options are for Danger Areas. Did you consider the acceptability of a Transponder Mandatory Zone or a Radio Mandatory Zone? Or a change in classification of airspace?	Email (see Annex 1)	FUA, Impact on military aviation users	1 & 2	Discussion: The design options have been promulgated as Danger Areas (DA), rather than as Radio or Transponder Mandatory Zones (RMZ/TMZ) in order to be compliant with CAA CAP722 Unmanned Aircraft System Operations in UK Airspace – Guidance & Policy. CAP722 states that "Unless able to comply with the current requirements of the Air Navigation Order (ANO), including the Rules of the Air, Unmanned Aircraft System (UAS/drone) flights which are operated beyond the visual line of sight (BVLOS) of the remote pilot are required to be contained within segregated airspace. The UK uses DAs as the primary method of airspace segregation for UAS operations".

					Conclusion: The current Design Options satisfactorily address this point in full.
40	Whilst more complex, the MOD would prefer the more dynamic Option 2. What UAS have you used to come up with the design?	Email (see Annex 1)	FUA, Impact on military aviation users, RDT&E objectives	1 & 2	Discussion: We have not used any individual UAS/drone specification to drive the DA airspace design because the performance and test and evaluation requirements of all the anticipated future types will vary significantly. Instead we took inputs from multiple different potential users and have sought to balance the requirements for novel aerospace RDT&E, the need for flexible use of airspace (via segmentation), the desire to minimise the number of requests to AROps for Temporary Danger Areas and the need to provide the growing novel aerospace sector with a surety of being able to operate in the UK on a reactive basis. The justification for lateral and vertical dimensions of both DA options has been detailed in Section 2.3 of this report. Conclusion: The current Design Options satisfactorily address this point in full.
41	Noted in your design that the areas may be activated between 2000' and 6000' – would you propose to use altitudes between or would it be one or the other? What proportion of the time do you think the airspace will be activated above 3000'? The MOD would require a LOA to ensure any activation above 4000' is deconflicted with Valley GH C (as per the VATAs) operations.	Email (see Annex 1)	FUA, Impact on military aviation users	1 & 2	Discussion: We have made a forecast of future business and anticipate that we will need to activate the Danger Area on approximately 100 days per year, with operations above 2000ft likely only 33% of the time (*i.e.* roughly once every 10 days) relative to a base level of 4000ft for Texan T1 and 5000ft for Hawk T2. We will only segregate the minimum amount of airspace required at any given time – *i.e.* we would propose to use altitudes between 2000ft and 6000ft as required. Activation above 4000ft is therefore unlikely to cause a significant schedule conflict for RAF/MOD training and we are confident that all coordination and operational integration issues can be managed via LOA.

					Conclusion: The current Design Options are considered to be fully compatible with military training operations whilst meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).
42	I welcome the fact that you have had a dialogue with the Danger Area Airspace Manager, and that you envisage only activating C and D when accessing D201. I also note that you are considering a LOA with D201 – we would view this as crucial. How would you gather information ensuring that activation protocols were in line with FUA principles? If this is not the case, safe separation against D201 operations would need to be considered. As you are proposing a FISO for your operations, the MOD would like to fully understand how you would propose coordination?	Email (see Annex 1)	FUA, Impact on military aviation users, safety	1 & 2	Discussion: As per line items (20) and (22). Llanbedr FIS will provide a Danger Area Activity Information Service (DAAIS) for all airspace users in the vicinity of the DA. Conclusion: The current Design Options are considered to be fully compatible with D201 operations whilst also meeting other stakeholder requirements, but continued community engagement is needed to further refine the details and operating procedures that will inform a Letter of Agreement (LOA).
43	How would you ensure lost link procedures remain within the confines of the proposed airspace? As you are only proposing using a FISO are there any more safety barriers you would consider employing?	Email (see Annex 1)	FUA, Impact on military aviation users, safety	1 & 2	Discussion: DA containment and other safety considerations are primarily the responsibility of the individual drone operator and will have to be addressed as part of an Operating Safety Case and be submitted to the CAA for approval before any flight within the DA will be allowed. As DA sponsor we will advise and support as required. Conclusion: The current Design Options satisfactorily address this point in full. *Note, a follow-up letter has been sent to this stakeholder to expand on the discussion of their comments (line items 37 to 43)*

44	We wish for the purposes of making a reply to sustain the main thrust of our clients concern: • Impact on local and visitor safety in and around the airfield. • Impact on health and well- being of locals and visitors in the area. • Impact on local economy – cost benefit analysis. If this genuinely is intended to create local jobs, let's see a plan of this and please ensure the plan realistically also considers what impact this proposal may have on existing jobs namely in tourism in the locality. • That these proposals do not infringe on neighbouring property rights and the quiet enjoyment of those properties are not prejudiced. • That these proposals do not adversely impact on the value of local businesses and homes.	Email (see Annex 1)	Over-land operation, environmental impact	1 & 2	As per line items (34) and (35)
45	GATCO is in favour of Airspace design option #2 for the following reasons: we believe that the further divisions of area B into areas A, B, E and F 1 and 2 provides greater flexibility for airspace users, in accordance with design principles 3 and 10. Furthermore the divisions will minimise environmental impact on the land areas (design principle 7).	Email (see Annex 1)	FUA, environmental impact	1 & 2	Discussion: Noted preference for Option #2. Conclusion: The current Design Options satisfactorily address this point in full.
46	We are very conscious of safety issues with flights over the village. The flying of drones, close to built-up areas would also be a matter of concern for the Councillors at Llanbedr.	Email (see Annex 1)	Safety, environmental impact	1 & 2	As per line item 2

Table A1 *- Mapping of the key points of stakeholder feedback on the draft Design Options (detailed in full in Annex 1) to the decisions and conclusions drawn in Section 2 of this report*

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