LAND'S END AIRPORT

CAP 1616 – AIRSPACE CHANGE PROPOSAL

FOR THE

LAND'S END TRANSIT CORRIDOR (LETC)

-

STAGE 2 : DEVELOP & ASSESS

2B: OPTIONS APPRAISAL (PHASE 1 INITIAL)

ID : ACP-2019-75

LAND'S END AIRPORT

ACP SUBMISSION STEP 2B : OPTIONS APPRAISAL (PHASE 1 INITIAL)

October 2020

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i Abbreviations & Glossary of Terms

ACAS	Airborne Collision Avoidance System	Equipment fitted to an aircraft that will provide information on other aircraft regarding range, altitude and bearing.
ACP	Airspace Change Proposal	The process by which a sponsor applies for a change to the design of a part of the UK airspace
ADS-B	Automatic Dependant Surveillance Broadcast	A way for an aircraft to determine its position via satellite navigation and periodically broadcast it, enabling it to be tracked
AIAA	Area of Intense Aerial Activity	
ATC	Air Traffic Control	
ATCA	Air Traffic Control Assistant	
ATCO	Air Traffic Control Officer	
ATCU	Air Traffic Control Unit	
ATM	Aerodrome Traffic Monitor	A type of radar used to assist in the safe operation of runways and airport utilisation
CAA	Civil Aviation Authority	The UK's aviation regulator ensuring that aviation reaches the highest safety standards
CAP	Civil Aviation Authority Publication	
CAT	Commercial Air Transport	
DP	Design Principle	
EC	Electronic Conspicuity	A means of aircraft transmitting their position to other ground or air-based systems
GA	General Aviation	
IFR	Instrument Flight Rules	A term used to describe a pilot flying and navigating the aircraft with reference to the instruments in the flight deck
ISSC	Isles of Scilly Steamship Company	
ISSG	Isles of Scilly Steamship Group	
LETC	Land's End Transit Corridor	

MLAT	Multilateration	A navigation and surveillance technique used to provide information on the position of an aircraft
PAX	Passengers	
PINS	Point In Space	A non-precision instrument approach mainly used by helicopters
RMZ	Radio Mandatory Zone	A designated piece of airspace that requires all aircraft to be fitted with and operate suitable two-way radio equipment
RNAS	Royal Naval Air Station	
RNAV	Area Navigation	A method of navigation that allows an aircraft to choose any course within a network of navigation beacons
SAR	Search and Rescue	
TCAS	Traffic Collision Avoidance System	Suitably equipped aircraft communicate digitally, between themselves, information regarding range, altitude and bearing to provide advice on airborne collision avoidance
TMZ	Transponder Mandatory Zone	A designated piece of airspace that requires all aircraft to be fitted with and operate electronic conspicuity equipment
UK	United Kingdom	

1 Introduction

1.1 This document forms part of the document set required in accordance with the requirements of the CAP1616 airspace change process.

1.2 This document aims to provide adequate evidence to satisfy Stage 2 Develop and Assess Gateway, Step 2B Options Appraisal (Phase 1 Initial), including Safety Assessment. It is advised to read this document alongside the Stage 2A Design Options and Stage 2A Design Principle Evaluation documents which between them give details of all the options considered and evaluates each option against the Design Principles described in the Stage 1B Design Principles document.

1.3 Land's End Airport is proposing to introduce an improved airspace solution to the Land's End Transit Corridor (an existing block of airspace linking the mainland to the Isles of Scilly) that could provide mitigation to the current unknown traffic environment. With an increase in air traffic movements within the Land's End Transit Corridor, the commencement of a second commercial operator (Penzance Helicopters) and the introduction of multiple IFR approaches (with more planned) a need for an Airspace Change was identified.

1.4 The owner of Land's End Airport, the Isles of Scilly Steamship Company (ISSC), has been providing lifeline services between the mainland and the islands for over 100 years. Air services provide a year-round lifeline link between the mainland and the Isles of Scilly and this proposal represents the final stage of a major investment program for the benefit of the island-based community and visitors.

1.5 This proposal is related to improving the safety of existing services and not about stimulating new traffic or altering any existing routes.

1.6 The Land's End Transit Corridor is situated in the far South-West of England and is an established block of airspace approximately 38nm long and 15nm wide (Surface to 4,000ft altitude) linking the mainland to the Isles of Scilly.

It is situated in Class G airspace and partially within the RNAS Culdrose AIAA. (See Appendix A for diagram)

1.7 The LETC is used predominantly by scheduled passenger and freight carrying flights - both fixed-wing and, as of March 2020 from Penzance Heliport, rotary aircraft. In addition, it is used by military aircraft (both fixed-wing and rotary), SAR & Helimed helicopters, Trinity House helicopters, General Aviation flights and other charter and air-taxi operators.

Aircraft using the LETC become funnelled within a very narrow lateral and vertical area of airspace. In order to provide increased protection for all users, and in particular, the scheduled public transport flights - some of which may be conducting IFR RNAV approaches - a need for an airspace change was identified.

Air Traffic Control Officers (ATCO's) at Land's End Airport and St. Mary's Airport oversee the safe, orderly and expeditious flow of aircraft using the LETC. The current

LETC operation is further enhanced by an existing Letter of Agreement made between Operators and Land's End and St. Mary's ATCU's. An additional specific Letter of Agreement between Land's End ATCU and RNAS Culdrose ATCU details the procedures for when the Land's End RNAV approaches are in use.

There are now four Airports/Heliports situated within the LETC – Land's End Airport, St. Mary's Airport, Penzance Heliport and Tresco Heliport. All these destinations are served by commercial air transport and all have, or intend to have, their own IFR RNAV or PIN's approaches.

1.8 Land's End Airport handled 15,042 aircraft movements (11,177 Airport Movements and 3,865 Overflights) and 64,000 terminal pax in 2019 (Jan-Dec). This makes it the 36th busiest Airport in the UK.

St. Mary's Airport handled 12,329 Airport Movements and 94,000 terminal pax in 2019 (Jan-Dec). This makes it the 35th busiest Airport in the UK.

2 Change Level

2.1 The changes in this ACP mainly impact flights over the sea (the majority of the LETC is SW of Land's End Airport). Hence in accordance with the Levels as defined in CAP1616, it is expected that this proposal is categorised as a Level 2C change.

2.2 It is not anticipated that this change will have an adverse effect on CO2 emissions or noise impacts to stakeholders on the ground, therefore no further environmental impact assessments have been conducted. If it becomes apparent that any of the options did alter the track or anticipated fuel burn for aircraft, then the sponsor will carry out a more detailed assessment or analysis for CO2 and noise impacts.

3 Options Appraisal

Land's End airport utilises a risk register to keep track of the highest risks to business and safe operations at the airport. When taking into account the top 40 risks, the nature of the airspace in the LETC has featured continuously in the top 5. The airline that serves the Isles of Scilly, based at Land's End airport, also comprises a risk register and it's top 5 risks also have the LETC airspace design featuring highly. Whilst these documents hold company sensitive information copies of both risk registers have been made available to the CAA in confidence.

We have looked at a number of available options for consideration with the aim of improving the airspace environment in which aircraft operate between Penzance, Land's End and the Isles of Scilly. These are detailed below.

3.1 Do Nothing

The "Do Nothing" option assumes that there are no mitigating design principles implemented and all users continue to operate within the LETC with no changes made to enhance safety.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	There would be no changes to workload for ATC. Capacity of the airspace in terms of the number of aircraft would not change.
General Aviation	Access	Qualitative	No change from today
General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative	There would be no increase in effective capacity

General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Qualitative	No change from today
Airport / ANSP	Infrastructure costs	Qualitative	No change from today
Airport / ANSP	Operational costs	Qualitative	No change from today
Airport / ANSP	Deployment costs	Qualitative	No change from today

3.2 Obtain Radar feed from existing Radar unit

This option calls for Radar information to be fed into an Air Traffic Monitor (ATM) unit at Land's End Airport. Agreements and contracts would need to be entered into between all parties and specific tests and assurances made to ensure accuracy, reliability and availability. Upgrades to the current telephone and data lines would be needed. All ATCO's would need to be further trained in the use of the ATM and a renewal of ATCO currency and competency examination carried out by SARG.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	ATC workload may increase as a result of a higher level of ATS being available to aircraft, should they choose to receive this level of service, if not then workload would remain the same. Capacity of the airspace in terms of the number of aircraft would not change.
General Aviation	Access	Qualitative	No change from today

General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative & Monetise	There would be no increase in effective capacity at the airport. There would be an economic impact on GA, not related to capacity, in the form of the airport increasing landing fees, parking fees and the price of fuel. It is estimated that this would see approximately a 10% increase in costs for GA.
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Monetise	The sole commercial operator at Land's End airport, Skybus, would bear the brunt of any increase in airport operating costs. This would equate to approximately 98% of any extra costs involved by adopting this change.
Airport / ANSP	Infrastructure costs	Monetise	For the ANSP to setup data line installations, feed costs, safety case and flight calibration, estimated £60K - £120K.
Airport / ANSP	Operational costs	Monetise	The ANSP would have to obtain radar feed from an approved source at an estimated cost of £60K annually.
Airport / ANSP	Deployment costs	Monetise	To further train ATS to the required level would have an estimated cost of £150K.

3.3 Install Radar

This option calls for the purchase and installation of a Radar system at Land's End airport. A suitable site would need to be found for the installation and necessary planning permissions obtained before any physical equipment could be installed. Upgrades to the current telephone and data lines would be needed. All ATCO's at Land's End would need to be trained and qualified in the use of Radar and a maintenance contract by an outside Air Traffic Engineering contractor entered into.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	ATC workload may increase as a result of a higher level of ATS being available to aircraft, should they choose to receive this level of service, if not then workload would remain the same. Capacity of the airspace in terms of the number of aircraft would not change.
General Aviation	Access	Qualitative	No change from today
General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative & Monetise	There would be no increase in effective capacity at the airport. There would be an economic impact on GA, not related to capacity, in the form of the airport increasing landing fees, parking fees and the price of fuel. It is estimated that this would see approximately a 10% increase in costs for GA.
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today

Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Monetise	The sole commercial operator at Land's End airport, Skybus, would bear the brunt of any increase in airport operating costs. This would equate to approximately 98% of any extra costs involved by adopting this change
Airport / ANSP	Infrastructure costs	Monetise	For the ANSP to install a radar at Land's End airport depending on the type of radar the estimated costs are £2-3M for primary and £4-6M for primary and secondary
Airport / ANSP	Operational costs	Monetise	The ANSP would have to enter into a maintenance contract with an approved ATE estimated at an annual cost of £30K
Airport / ANSP	Deployment costs	Monetise	To further train ATS to the required level would have an estimated cost of £150K.

3.4 Class D controlled airspace

This option calls for the reclassification of the LETC from class G to class D airspace. All ATCO's would have to undergo further inhouse training to cover the airspace differences and a renewal of ATCO currency and competency examination carried out by SARG.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on

			aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	ATC workload may increase as a result of a higher level of ATS being available to aircraft, should they choose to receive this level of service, if not then workload would remain the same. Even though the airspace would now be controlled capacity in terms of the number of aircraft that could utilise it would not change as the physical dimensions would not change.
General Aviation	Access	Qualitative & Monetise	Aircraft would need to obtain ATC clearance before entering the airspace so all aircraft would need to be in 2-way radio communication beforehand. There may be a very small number of aircraft, estimated to be <1% that do not, or would not wish to, use 2-way radio equipment and therefore would not be permitted to enter the airspace.
General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative	There would be no increase in effective capacity
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Qualitative	No change from today
Airport / ANSP	Infrastructure costs	Qualitative	No change from today
Airport / ANSP	Operational costs	Qualitative	No change from today
Airport / ANSP	Deployment costs	Monetise	The change of airspace would necessitate the upgrading of the ATS provided by Land's End ATC and therefore would result in an initial training cost of approximately £80K

3.5 Class E controlled airspace

This option calls for the reclassification of the LETC from class G to class E airspace. All ATCO's would have to undergo further inhouse training to cover the airspace differences and a renewal of ATCO currency and competency examination carried out by SARG.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	ATC workload would remain the same as there would not be any significant changes that ATC could make to the level of service provided. If the ATS were to be upgraded the level of service would be enhanced but the capacity would not be affected. Even though the airspace would now be controlled capacity in terms of the number of aircraft that could utilise it would not change as the physical dimensions would not change.
General Aviation	Access	Qualitative	IFR aircraft would need to obtain ATC clearance before entering the airspace. VFR aircraft could still operate unrestricted and need not be in 2-way radio communication with ATC if they did not wish to receive an ATS.

General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative	There would be no increase in effective capacity
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Qualitative	No change from today
Airport / ANSP	Infrastructure costs	Qualitative	No change from today
Airport / ANSP	Operational costs	Qualitative	No change from today
Airport / ANSP	Deployment costs	Monetise	The change of airspace may necessitate the upgrading of the ATS provided by Land's End ATC as at present only one IFR aircraft can be handled at a time. If this upgrade was deemed appropriate this would result in an initial training cost of approximately £80K

3.6 Radio Mandatory Zone (RMZ)

This option calls for the reclassification of the LETC to an RMZ. Exact size and boundaries of the RMZ would need to be agreed with adjacent ATCUs and operating agencies of the RMZ decided upon.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	ATC workload would remain the same as there would not be any significant changes that ATC could make to the level of

			service provided. Capacity in terms of the number of aircraft that could utilise it would not change as the physical dimensions would not change.
General Aviation	Access	Qualitative & Monetise	Aircraft would need to be in 2-way radio communication with ATC before entering the airspace and maintain that contact whilst operating within it. There may be a very small number of aircraft, estimated to be <1% that do not, or would not wish to, use 2-way radio equipment and therefore would not be permitted to enter the airspace. Prior agreements may be able to be made beforehand regarding the operation of aircraft within the airspace before establishing 2-way radio communication with ATC.
General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative	No change from today
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Qualitative	No change from today
Airport / ANSP	Infrastructure costs	Qualitative	No change from today
Airport / ANSP	Operational costs	Qualitative	No change from today
Airport / ANSP	Deployment costs	Qualitative	No change from today

3.7 Transponder Mandatory Zone (TMZ)

This option calls for the reclassification of the LETC to a TMZ. Exact size and boundaries of the TMZ would need to be agreed with adjacent ATCUs and operating agencies of the TMZ decided upon along with any standard SSR codes for aircraft operating within the LETC. All aircraft

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	ATC workload would increase as there would be more coordination with a radar unit as ATC became aware of traffic in the LETC as there would be no requirement for 2-way radio communication between aircraft and ATC. Capacity in terms of the number of aircraft that could utilise the airspace would not change as the physical dimensions would not change.
General Aviation	Access	Qualitative & Monetise	Aircraft would need to be equipped with and operate suitable transponder equipment. There may be a very small number of aircraft, estimated to be <1% that do not, or would not wish to, use transponder equipment and therefore would not be permitted to enter the airspace. Prior agreements could be

			entered into to allow limited operation of these aircraft subject to other factors agreed with ATC.
General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative	No change from today
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Qualitative	No change from today
Airport / ANSP	Infrastructure costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the ANSP would have to setup data line installations, feed costs, safety case and flight calibration, estimated £60K - £120K.
Airport / ANSP	Operational costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the ANSP would have to obtain radar feed from an approved source at an estimated cost of £60K annually.
Airport / ANSP	Deployment costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the ANSP would have to train ATS to the required level which would have an estimated cost of £150K.

3.8 Implementation of a combined RMZ / TMZ

This option calls for the reclassification of the LETC to a combined RMZ / TMZ. All aircraft wishing to operate within the LETC would need to be both transponder and radio equipped and be in contact with the appropriate agency before entering.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for

			noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	ATC workload would increase as there would be more coordination with a radar unit as to verify and confirm SSR compliance. It could be possible to mitigate this requirement as all aircraft would be in 2-way radio communication as well and so Land's End ATC would be fully aware of all aircraft operating within the LETC. Capacity in terms of the number of aircraft that could utilise the airspace would not change as the physical dimensions would not change.
General Aviation	Access	Qualitative & Monetise	Aircraft would need to be equipped with and operate suitable transponder and 2-way radio equipment. There may be a very small number of aircraft, estimated to be <1% that do not, or would not wish to, use this equipment and therefore would not be permitted to enter the airspace. Prior agreements could be entered into to allow limited operation of these aircraft subject to other factors agreed with ATC.
General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative	No change from today
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today

Commercial airlines	Other costs	Qualitative	No change from today
Airport / ANSP	Infrastructure costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the ANSP would have to setup data line installations, feed costs, safety case and flight calibration, estimated £60K - £120K.
Airport / ANSP	Operational costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the ANSP would have to obtain radar feed from an approved source at an estimated cost of £60K annually.
Airport / ANSP	Deployment costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the ANSP would have to train ATS to the required level which would have an estimated cost of £150K.

3.9 Alter the size and dimensions of the LETC

Changing the dimensions of the LETC would take into account any parts of the IAPs at Land's End airport that are currently outside of the LETC. It could also consider making the LETC larger to alleviate any areas of potential congestion.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	Most of the LETC is over the sea between Land's End and the Isles of Scilly, so any anticipated change would most likely also be over the sea and if so, there will be no impact for noise. If an increase in size were proposed over the land portion of the LETC a comprehensive study into the impacts on noise and air quality would be undertaken with particular emphasis on how these might

			impact quality of life for those communities being overflown.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	Even though the LETC size might change it's not anticipated that the number of aircraft would increase therefore ATC workload would remain the same
General Aviation	Access	Qualitative	No change from today
General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative	No change from today
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Qualitative	No change from today
Airport / ANSP	Infrastructure costs	Qualitative	No change from today
Airport / ANSP	Operational costs	Qualitative	No change from today
Airport / ANSP	Deployment costs	Qualitative	No change from today

4.0 Automatic Dependent Surveillance – Broadcast (ADS-B)

ADS-B is a surveillance technology in which an aircraft determines its position via satellite navigation and periodically broadcasts it, enabling it to be tracked. The information can be received by air traffic control ground stations. ADS–B is "automatic" in that it requires no pilot or external input. It is "dependent" in that it depends on data from the aircraft's navigation system. (https://en.wikipedia.org/wiki/Automatic_dependent_surveillance_%E2%80%93_broadcast)

This option calls for the installation of an ADS-B receiver at the airport. At present this technology is on trial in the UK and not available for air traffic control use. It would be limited to providing planning information only.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health & quality of lifestyle	Qualitative	There will be no proposed changes to air traffic patterns so there will be no impact for noise. Most of the LETC is over the sea between Land's End and the Isles of Scilly.
Communities	Air quality	Qualitative	No changes to aircraft routings below 7000 ft so no effect on air quality
Wider Society	Greenhouse gas impact	Qualitative	No changes to aircraft routings below 7000 ft so no effect on aviation greenhouse gas emissions.
Wider Society	Capacity / resilience	Qualitative	ATC workload would not increase as the information gathered from this option would not be able to be used for a safety critical role as it would only be displayed from an unapproved source.
General Aviation	Access	Qualitative	No change from today
General Aviation / Commercial airlines	Economic impact from increased effective capacity	Qualitative	No change from today
General Aviation / Commercial airlines	Fuel burn	Qualitative	No change from today
Commercial airlines	Training costs	Qualitative	No change from today
Commercial airlines	Other costs	Qualitative	No change from today
Airport / ANSP	Infrastructure costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the

			ANSP would have to setup data line installations, feed costs, safety case and flight calibration, estimated £60K - £120K.
Airport / ANSP	Operational costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the ANSP would have to obtain radar feed from an approved source at an estimated cost of £60K annually.
Airport / ANSP	Deployment costs	Qualitative & Monetise	If ATC wished to benefit from the information gained from electronic conspicuity then the ANSP would have to train ATS to the required level which would have an estimated cost of £150K.

4 Safety Assessment

4.1 Options Appraisal Safety Assessment – Do Nothing

There have been a number of safety related reports regarding operation of aircraft in the LETC. Some have been reported through the MOR scheme, some AIRPROX and some through the internal Land's End Airport or Skybus Safety Management Systems. These reports all related to incidents before the second commercial operator, Sloane Helicopters, started regular scheduled flights to and from Penzance heliport. Since then the traffic volume operating within the LETC has increased to sometimes an extra 40 air traffic movements per day.

In addition to this, RNAV (GNSS) + PINS approaches have been or are imminent, at four airports/heliports within 35NM of each other with more aircraft potentially flying IFR. Since this level of traffic is likely to continue and safety concerns are still being raised by pilots and ATCO's 'do nothing' is not a viable option. Safety data has been gathered from a number of sources and not necessarily all from reportable incidents so the quantitative number of actual reports may seem low. There have been a number of incidents where observation has been made of unidentified traffic within the LETC by ATC and pilots (the most recent of which by a helicopter pilot on Thursday 3rd September 2020) that did not warrant a formal report.

5.2 Options Appraisal Safety Assessment – Obtain Radar Feed

Surveillance information could be obtained from an approved source and displayed in the VCR on a small Radar screen called an Air Traffic Monitor. ATCO's could then use this information in an approved manner to provide extra guidance and information to aircraft flying within the LETC. The ANSP would have to approach one of the local Radar units, RNAS Culdrose or Newquay Cornwall Airport or both, and investigate the possibility of obtaining a real-time Radar feed.

Points to be considered with this are

- Approval from the CAA
- Compliance with all EASA and CAA legislation
- Integrity of the Radar feed
- Latency (Time lag between gathering and displaying information)
- Periods of availability of the Radar feed
- Installation costs (Upgrading broadband, Radar display equipment, etc)
- Radar information costs (contract with the Radar unit)
- Maintenance contract with existing ATE organisation
- Training costs for ATC staff (COVID 19 restrictions have currently made the availability of college-based training unpredictable)
- Radar coverage at lower levels in the LETC may not be consistent/reliable (Commercial and Military flights often fly at 500ft, 1,000ft and 1,500ft in the LETC)

Introducing a real-time Radar feed to Land's End would be an option if costs could be controlled but in this time of economic uncertainty it would be unwise to enter into what would likely be a large initial and moderate ongoing costs without any reliable way to make these costs meet the business model.

Since many of these costs are still unknown and likely to be greater than the airport could sustain 'Obtain a Radar feed' is not a viable option.

5.3 Options Appraisal Safety Assessment – Install Radar

Installing a Radar system at Land's End would allow ATC to offer a higher level of service to aircraft flying in the LETC. A suitable location would need to be found to site the Radar antenna with considerations made for safety of the public on the ground, high ground causing blind spots on the Radar display and overall effective Radar coverage of the LETC.

Points to be considered with this are

- Approval from the CAA
- Compliance with all EASA and CAA legislation
- Suitable location for the Radar antenna

- Planning permissions
- Environmental impact
- Training at the ATC college for ATCO's (COVID 19 restrictions have currently made the availability of college-based training unpredictable)
- Purchase and installation costs
- Maintenance contract with existing ATE organisation

The environmental impact of constructing and operating a Radar at Land's End would be considerable in terms of visual impact, safety of the public, and noise of operation (Radar antenna rotate and so there is some noise impact although this may be low). The costs involved in purchase, installation, staff training and maintenance of the Radar unit would place undue financial burden on Land's End airport and so 'Install Radar' is not a viable option.

5.4 Options Appraisal Safety Assessment – Class D Airspace

Class D is a type of controlled airspace where all flights wishing to operate within it need to obtain a clearance before entry and whilst inside comply with ATC instructions. This should eliminate all unknown traffic from the LETC and thus increase safety margins for all operators equally. Flights can be conducted under IFR or VFR or SVFR day or night.

Points to be considered with this are

- All flights would need a clearance to enter the LETC
- Land's End ATC (Aerodrome "Tower" Control Service (ADI)) is only permitted to operate one IFR aircraft at a time
- Land's End ATC may not be permitted to operate IFR and SVFR flights at the same time
- Military traffic may be more restricted than they are at present due to having to comply with specific ATC instructions
- A new LOA with RNAS Culdrose would be needed and take into consideration the overlap of the LETC and the Culdrose AIAA

There are many plusses to having the LETC designated class D controlled airspace but also a few rather large hurdles to tackle as well. Land's End ATC is restricted to handling one IFR aircraft at a time and so this would bring in to question the real benefit of the airspace reclassification as multiple frequencies may have to be utilised to accommodate traffic in the same geographical area. This would present safety and timing issues regarding co-ordination between ATC units.

All flights would need an ATC clearance to enter the airspace and so during periods of high workload may result in delays and restrictions to GA and commercial flights alike. All in all, because of the LETC ending up in a far more complex state that it is 'Class D Airspace' in not a viable option.

5.5 Options Appraisal Safety Assessment – Class E Airspace

Class E is a type of controlled airspace where all IFR flights wishing to operate within it need to obtain a clearance before entry and whilst inside comply with ATC instructions. VFR flights do not need this clearance and do not need to participate in an ATS, therefore do not need to establish 2-way radio communication and so there would still be an unknown traffic element. Flights can be conducted under IFR or VFR day or night.

Points to be considered with this are

- IFR flights would need ATC clearance to enter the LETC
- Land's End ATC is only permitted to operate one IFR aircraft at a time
- VFR flights could still enter the LETC without clearance or radio contact

Class E airspace doesn't eliminate the possibility of unknown traffic in the LETC and so 'Class E Airspace' is not a viable option.

5.6 Options Appraisal Safety Assessment – Radio Mandatory Zone (RMZ)

Should the LETC be reclassified as an RMZ then all aircraft wishing to operate within would have to establish 2-way radio communication with ATC before entry. This should remove the possibility of unknown traffic from the LETC. If a pilot cannot establish 2-way communication with ATC then he would have to remain clear of the RMZ. There are circumstances under which certain activities take place without radio contact at present (e.g. para gliding at Sennen Cove) and with careful planning and formal agreements these activities could continue. Again, by entering into letters of agreement, aircraft could get airborne from sites within the RMZ and establish 2-way radio communication at the earliest opportunity.

The RMZ may not need to be active 24/7 and could be promulgated to coincide with the commercial operations of the airports/heliport within the LETC thus making the LETC as accessible as possible in line with increased safety margins. Currently commercial operations take place Mon–Sat 0800-1830. Any extra commercial operations could be covered by NOTAM.

Points to be considered with this are

- All aircraft must establish 2-way radio communication with ATC to operate within the LETC
- Almost all aircraft are fitted with appropriate 2-way radio communication equipment and for those that aren't handheld radios can be purchased and used effectively
- Certain activities may be permitted without radio contact under a LOA (An informal discussion and further clarification has already taken place with

stakeholders who expressed concern over not being granted access due to non-radio operation. Land's End ATC clearly stated the overarching goal of increasing safety for all users and continuing the policy of access for all)

- This is a good option for GA operations as it is a practical middle ground between doing nothing and having controlled airspace, which would pose many restrictions to aircraft wishing to operate within the LETC
- Although a clearance isn't needed to enter an RMZ, CAA policy is if a pilot is told to 'standby' they are to remain clear of the airspace **(14 August 2015: POLICY FOR RADIO MANDATORY ZONES AND TRANSPONDER MANDATORY ZONES, Annex A)**
- Legislation that the UK CAA has adopted from the EU regarding RMZ can be located following this link https://www.legislation.gov.uk/eur/2012/923/annex/section/6/division/sera.6005/adopted

The establishment of an RMZ would eliminate the unknown traffic element in the LETC and not pose too many restrictions to aircraft in terms of cost and access so 'Radio Mandatory Zone (RMZ) is a viable option.

5.7 Options Appraisal Safety Assessment – Transponder Mandatory Zone (TMZ)

CAP 1391 is published by the CAA to highlight the benefits and reasons behind aircraft operating with electronic conspicuity (EC). At the most basic level, aircraft equipped with an EC device effectively signal their presence to other airspace users, turning the 'see and avoid' concept into 'see, BE SEEN, and avoid.'

Should the LETC be reclassified as a TMZ then all aircraft wishing to operate within would have to operate a transponder in accordance with promulgated ATC procedures. A pilot wishing to operate within the TMZ without a transponder may be granted permission to do so under certain ATC approval, if not then he would have to remain clear of the TMZ.

A number of different types of aircraft are now fitted with TCAS (Traffic Collision Avoidance System), a system where another aircraft's transponder is interrogated, and information received regarding bearing and altitude and whether this aircraft poses a potential proximity risk. If all aircraft operated a transponder in the LETC, other aircraft fitted with a TCAS system would benefit.

Land's End ATC is unable to utilise information from transponders other than viewing an unapproved source of surveillance information (e.g. FlightRadar24). An ATC unit cannot use an unapproved source for anything other than forward planning and so could not pass any information viewed on this source to an aircraft on its frequency.

It is possible that aircraft may comply with the requirements of the TMZ but still not be in 2-way radio contact with ATC and thus Land's End ATC may not be aware of certain traffic until notified by another ATC unit. For Land's End ATC to confirm

compliance with the TMZ every flight would need to be coordinated with a Radar unit, thus increasing the workload to what may become an unmanageable level. Safety margins may therefore be degraded, and the level of service reduced. (The need for allocation of codes and verification of such was raised by a stakeholder and would need to be addressed at an early stage. Land's End will seek appropriate professional/regulatory advice on this)

The establishment of a TMZ, on its own, would increase work levels at Land's End and may reduce safety and service levels and so 'Transponder Mandatory Zone (TMZ) is not a viable option.

5.8 Options Appraisal Safety Assessment – Combined RMZ / TMZ

Under this combination all aircraft wishing to operate within the LETC would need to operate a transponder in accordance with the local promulgated procedures and establish 2-way radio communication with ATC before entry.

As detailed above, the RMZ would remove the unknown traffic element from the LETC and the TMZ would ensure that an aircraft's onboard TCAS system could provide any relevant alerting information. Having both these elements combined should remove the potential of unknown traffic operating within the LETC.

(See notes from 5.6 (RMZ) and 5.7 (TMZ))

The benefits of removing unknown traffic from the LETC and increasing the usefulness of TCAS systems makes 'Combined RMZ/TMZ' a viable option.

5.9 Options Appraisal Safety Assessment – Alter the Dimensions of the LETC

One advantage of this option would be to enhance the awareness of IAP at Land's End. There would still be the potential of unknown traffic but having greater awareness may encourage all aircraft, operating in the vicinity of the LETC, to be in 2-way contact with ATC during airport operating hours.

5.10 Options Appraisal Safety Assessment – ADS-B

The installation of an ADS-B receiver at the airport would not introduce any large costs and could be carried out relatively simply. TCAS systems do not gather the same amount of information from ADS-B signals and thus would not trigger safety alerts but rather only give more information to potentially enhance situational awareness.

However, because the technology is currently on trial in the UK this wouldn't provide Land's End ATC with a timely solution. Therefore, until these trials are complete and a National policy has been confirmed, further enhancement to safety using 'ADS-B' is not a viable option at present.

(Land's End Airport is open to following the progress of this technology with a view to utilising it in the future if and when it becomes approved for ATC use within our existing capacity)

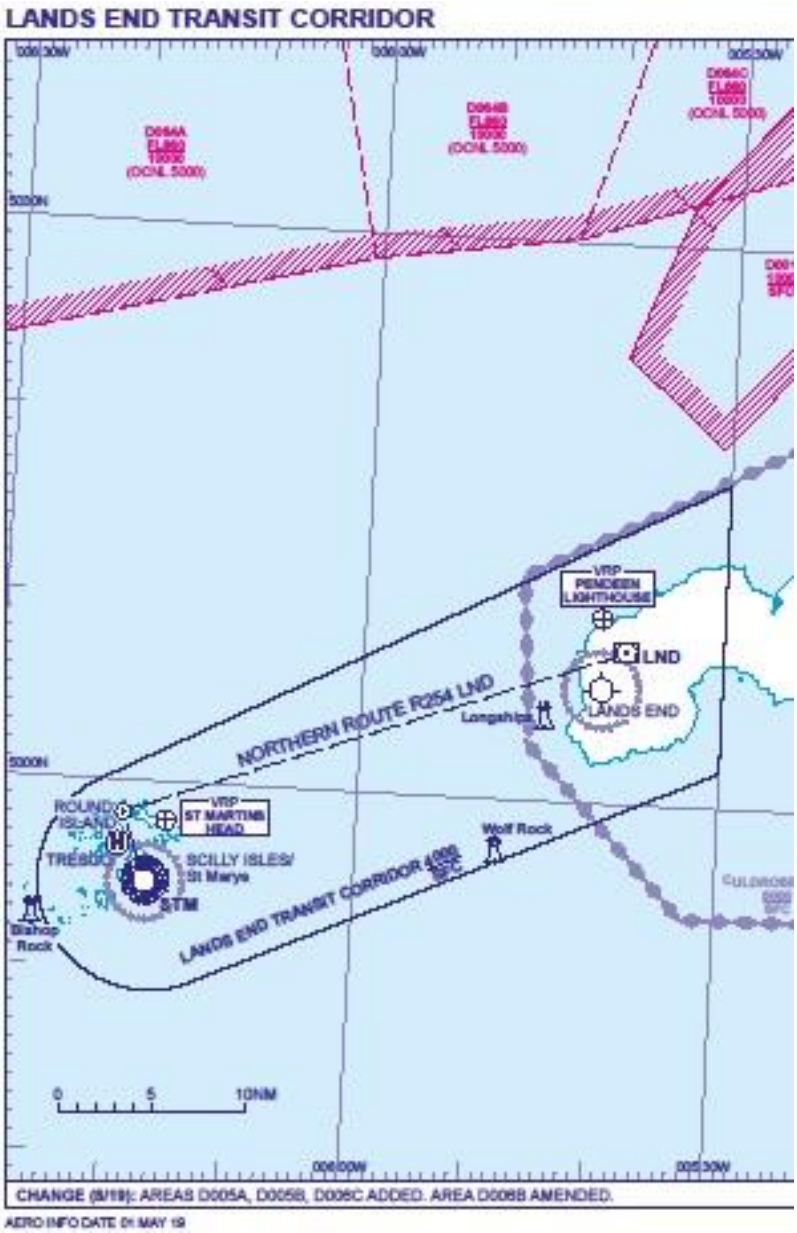
6 Safety Assessment Conclusion

After considering the above, listening to and including stakeholder feedback comments in the further development of the proposal it is concluded that the establishment of an RMZ be the minimal option taken forward with the preferred being the establishment of a Combined RMZ / TMZ. Further consideration should be given to altering the dimensions of the LETC and so this option should be taken forward to be utilised in combination with one of the above proposals. It is the opinion that this will provide safe and efficient mitigation to any present concerns and increase safety margins for all airspace users of the LETC.

7 Conclusions and Next Steps

Since none of the other options deliver the same sustainable and beneficial increase in safety the options of 'Radio Mandatory Zone' and 'Combined RMZ / TMZ' will be carried forward to consultation with consideration given to combining 'Alter the dimensions of the LETC' with the successful option.

APPENDIX A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PENDEEN
LIGHTHOUSE
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NORTHERN ROUTE R254 LND
ROUND
ISLAND
VRP
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TRESCO
SCILLY ISLES/
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CHANGE (5/19): AREAS D005A, D005B, D006C ADDED. AREA D008B AMENDED.
AERO INFO DATE 01 MAY 19