



Pembrokeshire County Council
County Hall □ Haverfordwest
□ Pembrokeshire □ SA61 1TP □ UK

T +44 1437 764 551
E enquiries@pembrokeshire.gov.uk
W www.pembrokeshire.gov.uk/

Airspace Change Proposal by Haverfordwest Aerodrome

Operational Requirements and Environmental Report

In partnership with:

HELIOS

an  egis company



Executive summary

Haverfordwest Aerodrome is planning to introduce new Instrument Approach Procedures (IAPs) for runways 03 and 21.

With this aim, the Airspace Change Proposal (ACP) process has been carried out in accordance with CAP 725. The ACP change sponsor, in this case is Pembrokeshire County Council undertook a stakeholder consultation with airspace and airport users and other organisations that may be affected directly or indirectly by the change.

The implementation of these IAPs procedures is a part of a European programme that aims to increase the availability of GNSS instrument approaches for general aviation and small commercial aircraft and helicopters. Haverfordwest is one of three UK aerodromes which received a 60% grant as a part of European project funded by the European Global Navigation Satellite System (GNSS) Agency in July 2016. The project is being coordinated in the UK by the Aircraft Owners and Pilots Association (AOPA) and the aviation consultancy Helios, in partnership with Haverfordwest Aerodrome.

After careful consideration of the responses to the consultation, Haverfordwest Airport is taking forward Option A - Implementation of instrument approaches as described in the Consultation Document without modification, through the submission of a formal Airspace Change Proposal.

This document presents the Operational Requirements and Environmental Report (refer to Appendix B and C of CAP 725), it is part of the formal proposal documentation and it is set out in order to address the various areas for SARG assessment as required by CAP 725.

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1 Operational Requirements

This section presents the Operational Requirements relating to Implementation of new GNSS IAPs at Haverfordwest aerodrome. This document is set out in the order below, to address the various areas for SARG assessment as required by CAP 725 CAA Guidance on the Application of the Airspace Change Process:

- i) Justification for the Change and Analysis of Change Options;
- ii) Airspace Description;
- iii) Supporting Infrastructure/Resources;
- iv) Operational Impact;
- v) Economic Impact;
- vi) Safety Management;
- vii) Airspace and Infrastructure Requirements; and
- viii) Supporting Maps, Charts and Diagrams.

1.1 Justification for the Change and Analysis of Change Options

Haverfordwest aerodrome is wholly owned and operated by Pembrokeshire County Council (PCC). PCC have undertaken a steady development programme, establishing the airport as a high-quality facility to support business and general aviation operations.

Haverfordwest aerodrome plans to introduce new Global Navigation Satellite System (GNSS) Instrument Approach Procedures (IAPs) to runways 03 and 21 for general aviation and small commercial aircraft and helicopters. The implementation of these instrument approaches will improve the aerodrome for existing and future customers through safer and more efficient operations with minimal impact to the general public due to a small nature of the change.

The IAPs strengthens the case for the aerodrome to prosper under the control of PCC through a net reduction in PCCs financial contribution to the operation of the aerodrome.

The Consultation Document stated the prime objectives for implementing the instrument approach procedures at Haverfordwest Aerodrome as:

- To improve the viability of the airport by ensuring access in lower visibility or deteriorating weather conditions for business aviation aircraft.
- To increase the safety of the aerodrome in lower visibility operations by providing satellite-guided approaches to runway 03 and 21. In particular to the approach to runway 21 over the Preseli Hills.
- To improve operational efficiency at the aerodrome by allowing the recovery of aircraft based at the aerodrome in deteriorating weather conditions.
- To improve transport links to Pembrokeshire.
- To allow instrument flight training at the airport.

1.1.1 The proposed options

The Consultation Document outlined the three options which were considered by Haverfordwest Aerodrome as being:

- **Option A – Implementation of instrument approaches**

Haverfordwest Aerodrome is proposing to introduce instrument approaches to runway 03 and 21 only which will be used in conjunction with the existing visual approaches. This option fully aligns with the objectives. **This is the aerodrome's preferred option.**

The proposed instrument approach will involve aircraft following Global Positioning System (GPS) waypoints that are programmed into the flight management computer on board the aircraft. They work on the same concept as a car “sat-nav”, but provide vertical as well as horizontal guidance.

The three main characteristics of this type of approach are:

- 1) The approaches from either ends of the runway will be a “straight-in” instrument approaches. In other words, the approach will follow an extended centre-line of the landing runway as compared to a proportion of visual approaches that involve the aircraft positioning within the visual circuit. This ‘straight-in’ design is optimal for both flight operations and safety and is established preferred practice for instrument approaches, as set out in CAA policy. CAA document CAP 1122, Appendix 1, clearly states that approach designs should be kept as simple and standard as possible, e.g. whenever possible no off-set approaches (approaches to be kept to the centre line of the runway).
- 2) Aircraft will follow a set path over the ground, leading to greater consistency of flight paths.
- 3) The proposal will not require any ground based equipment to be installed and therefore there are no equipment maintenance schedules. The instrument approaches are designed to use information from satellites for accurate navigation.

- **Option B – Do nothing**

This option does not meet the aerodromes requirements and objectives. It will not be possible to increase safety through assured obstacle clearance on approach to runway 21 or increase safety through enabling stabilised approaches to runway 03 and 21. It does not allow recovery for airport based aircraft in deteriorating weather conditions or provide local instrument training capabilities and transport infrastructure and better viability of the airport.

- **Option C – Implement NDB/DME approach**

Conventional ground based navigation aids such as Non-Directional Beacons (NDB) and Distance-Measuring Equipment (DME) are currently available for use at Haverfordwest Aerodrome, to aid pilots to find the aerodrome. There are however no associated approach procedures which make use of the equipment. The NDB does not provide vertical guidance to the pilot on approach and is liable to interference and interruptions in the signal due to thunderstorm activity and hilly terrain. Therefore, this further reduces the options available for pilots to make an instrument approach to Haverfordwest Aerodrome.

They require considerable investment with respect to maintenance and future equipment replacement at end of their operational life. They are also not as accurate as the proposed

instrument approach procedures and do not provide vertical guidance to the pilot. More importantly, they do not provide a safety benefit to the operation.

This option has been considered and discounted as not meeting the aerodrome's objectives. In addition, as these approaches are being phased out within the aviation industry the option does not feature in the consultation feedback form.

1.2 **Airspace description**

All approaches at Haverfordwest aerodrome are currently flown visually, aircraft can operate without restriction and therefore, in the absence of predefined prescribed tracks, traffic patterns decided by individual pilots and are random.

1.2.1 **Description of proposed Instrument Approach Procedures**

The Instrument Approaches to runways 03 and 21 have been designed in full compliance with ICAO Doc 8168 (PANS-OPS) for aircraft in approach speed categories A and B. The IAPs are of the 'usual T' design, with speed constraints of 140 KIAS for RWY 03 and 160 KIAS for RWY 21 in the Initial Approach Segments. The Initial segments are 3.3 NM long allowing aircraft to stabilise on the initial segment before anticipation of the turn at the Intermediate Fix. The heights of the Initial Approach Fixes are 2200' for RWY 03 and 2900' for RWY 21 to provide the required terrain and obstacle clearances.

The Intermediate Fix heights are 2000' for RWY 03 and 2900' for RWY 21. The Intermediate segments are aligned with the runway and have lengths, of 3NM with no descent for RWY 03 and 4NM with a descent to 2100' for RWY 21.

The Final Approach segments are aligned with the existing APAPI visual guidance and have LPV vertical path angles of 3.5° (6.12% LNAV) with Threshold Crossing Heights of 40' as required for Code 2 runways. The Final Approach Segment lengths are 4.9NM for RWY 03 and 5.2NM for RWY 21.

Rising terrain surrounding the Aerodrome results in minor vegetation penetration of the Visual Segment Surface for both runways and the operational significance of this will be assessed within the LPV flight validations.

The missed approaches have 3.2 NM segments aligned with the runways, before turning back to the westerly Initial Approach Fixes to enter Left-hand Holds.

The Draft GNSS IAP charts are presented in Section 1.8.

Figure 1 and Figure2 below define the path (dark blue line) aircraft using the instrument procedure will use when using runway 03 and 21. This will lead to a more predictable and repeatable route for approaches to the aerodrome when compared to the red lines which represent the path taken by aircraft approaching the aerodrome visually.

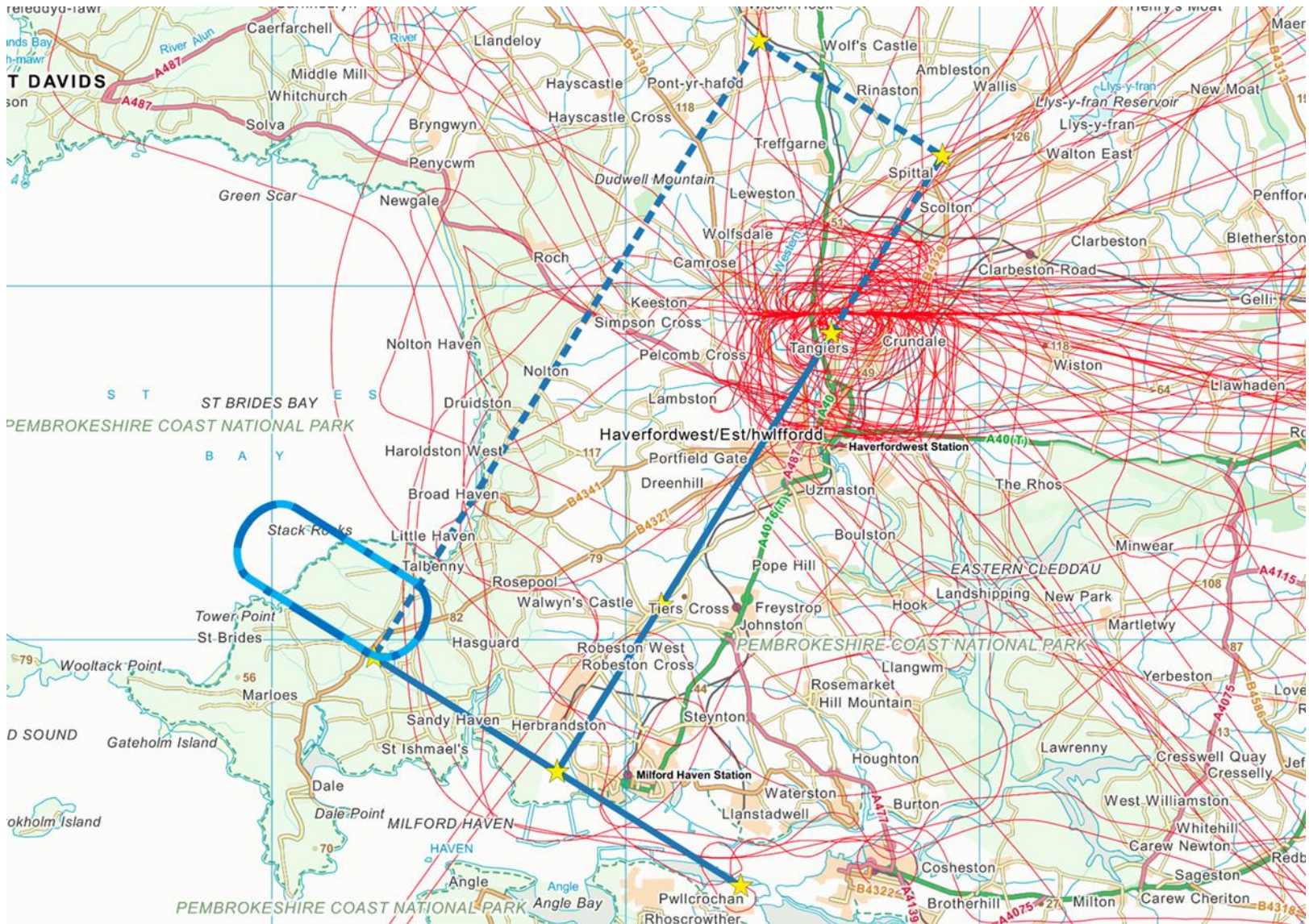


Figure 1: Proposed instrument approaches for runway 03

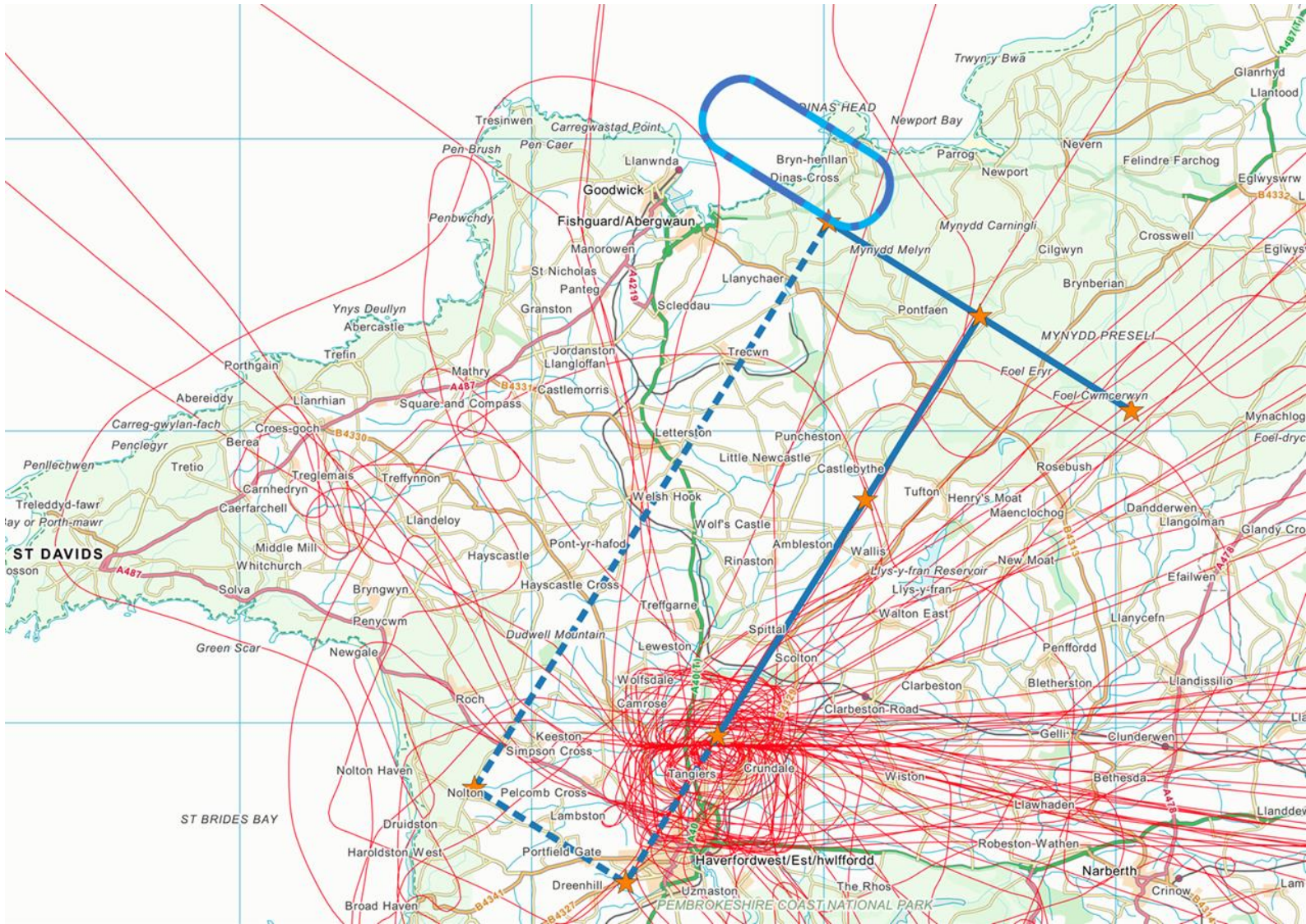


Figure 2: Proposed instrument approaches for runway 21

1.3 Supporting Infrastructure/Resources

1.3.1 Operational service

Haverfordwest aerodrome is located in Class G Airspace and is surrounded by an ATZ with a radius of 2NM and a height of 2000 ft above aerodrome elevation.

Within the ATZ and surrounding airspace, Haverfordwest operates an Air Ground Radio Service on 122.205 MHz with Designated Operational Coverage (DOC) of 25 NM and a ceiling of 5,000', this allows aircraft to establish communication with Haverfordwest well before arrival at any of the Initial Approach Fixes.

1.3.2 Aerodrome operational hours

Aerodrome operational hours are Monday to Friday from 09:15 to 16:30 and at other times by arrangement.

Flights operating into Haverfordwest currently require prior permission (PPR) from the aerodrome. To mitigate for the lack of an ATS service, following the approval of the GNSS approach procedures, aircraft planning to participate in the approach will be provided with a one hour timeslot in which to conduct their approach to ensure that only a single aircraft uses the approach at any time.

1.3.3 Equipment

Haverfordwest is equipped with an NDB and DME for aerodrome location and situational awareness purposes but use of IAPs is not dependent on the availability of the NDB or DME.

1.3.4 Runways

Runways 03 and 21 are asphalt visual runways but have non-precision runway markings. APAPI is available on both runways set at 3.5° with Minimum Eye Height (MEHT) of 15 feet. Runway 03 and 21 edges are equipped with low intensity omni-directional lighting.

1.3.5 RFF Category

The Haverfordwest aerodrome is RFF (Rescue and Fire Fighting) Category A1, which requires a minimum number of two staff designated to respond and operate RFF service provision.

1.4 Operational Impact

The introduction of new IAPs at Haverfordwest will have the following positive impacts on operation that are aligned with the objectives of the aerodrome as stated in the Consultation Document.:

- Improving the viability of the airport by ensuring access in lower visibility or deteriorating weather conditions for business aviation aircraft.
- Increasing the safety of the aerodrome in lower visibility operations by providing satellite-guided approaches to runway 03 and 21. In particular by providing a 'terrain safe' approach to runway 21 over the Preseli Hills.
- Improving operational efficiency at the aerodrome by allowing the recovery of aircraft based at the aerodrome in deteriorating weather conditions.
- To improve transport links to Pembrokeshire.

- To allow instrument flight training at the airport

Fly Wales is the largest operator and is based at Haverfordwest, having AOC commercial and ATO training operations (representing 45% of the aerodromes annual movements). The commercial operation involves transporting human organs for transplant and surgical staff between hospitals under contract to the National Health Service. The timing of these NHS flights are unpredictable, and time is a critical factor. With new IAPs, the aircraft will be able to return to Haverfordwest in deteriorating weather and therefore increase the viability of operations continuing from the aerodrome.

Analysis of flight plans indicates that IFR movements account for approximately 6% of the total annual movements at Haverfordwest, of which only a small proportion are currently declaring the capability to participate in the GNSS Approaches. It is expected that the percentage of aircraft capable of using the proposed IAPs will increase to around 6%, particularly as the BE200's of Fly Wales are currently equipped to fly the LNAV and LPV procedures and will complete the training requirements when the IAPs are available for beneficial use.

The remaining 94% of aircraft movements at the aerodrome are visual operations – including the vast majority of training flights and the importance of VFR operations at Haverfordwest will continue.

The growth in the numbers of instrument approaches being undertaken will be managed to ensure that IAP usage does not adversely impact the core VFR operations.

1.5 Economic impact

1.5.1 Cost benefit

The introduction of the GNSS instrument approach procedures can be implemented with no financial outlay on ground-based equipment and there are no associated on-going navigation aid operating and maintenance costs. By implementing the instrument approaches, Haverfordwest Aerodrome is optimising the operation for its current and future customers by providing safe and reliable procedures which can be used in poor weather conditions rather than diverting to alternate aerodromes. The IAPs supports the case for the aerodrome to prosper under the control of PCC with a net reduction in PCC's financial contribution to the operation of the aerodrome.

1.5.2 Benefits to commercial and training operations

As it was mentioned previously in section 1.4, Fly Wales, whose commercial operations involve transporting surgical staff and human organs for the NHS will be able to operate into the aerodrome in lower visibility conditions with new IAPs.

The training delivered at the aerodrome today does not include training to fly instrument approaches and the new procedures may also be used during good weather for instrument approach training. The volume of these good weather training approaches will vary depending on the intensity of other traffic and has been included in the annual estimate of 220 aircraft that are expected to use the instrument approaches.

1.6 Safety Management

Haverfordwest aerodrome does not provide an Air Traffic Service and has a non-instrument runway. Historically, UK CAA only permitted IAPs at airports with an instrument runway and with an ATC Approach service. In May 2014 CAA published CAP1122 –

“Application for Instrument Approach Procedures to Aerodromes without an Instrument Runway and/or Approach Control” providing a framework by which, an Instrument Approach Procedure may be implemented at an airfield without ATC or an Instrument Runway, where it can be demonstrated that the infrastructure deficiencies can be tolerated or effectively mitigated to provide an acceptable level of safety.

Regarding the safety assessment for the Haverfordwest CAP 1122 application, the following points applied:

- The CAP 1122 Baseline safety argument has been used in the Haverfordwest safety argument.
- A rigorous SMS already exists at Haverfordwest.
- The safety assessment process used is detailed in section 1.6.1 below.
- Oversight is provided by PCC who are the aerodrome licence holder.

1.6.1 Safety assessment process

The safety assessment has been developed in accordance with the principles of Haverfordwest SMS Change management. The figure bellow shows the safety assessment process developed in the following steps:

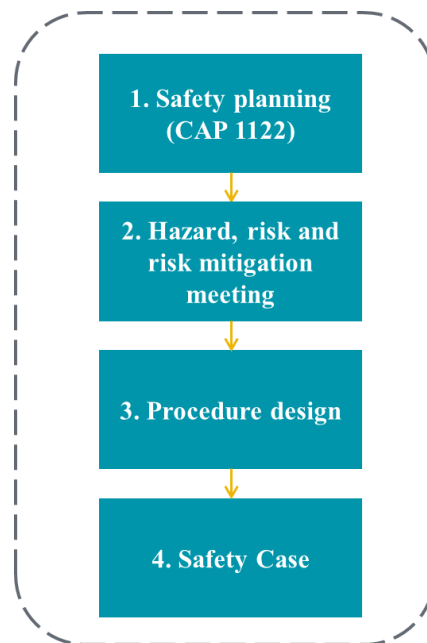


Figure 3: Safety assessment process

- **Safety Planning** - The CAP 1122 baseline safety argument was analysed, and all aerodrome limitations were addressed in the Safety Case.
- **Hazard, risk and risk mitigation meeting** – a HAZID meeting was held with Haverfordwest aerodrome, pilots (Fly Wales) and A/G operator to identify all the hazards, associated with the introduction of new IAPs at Haverfordwest aerodrome. The meeting also proposed mitigations to effectively reduce the risk from the introduction of the new IAPs.
- **Procedure design** – regarding to design of the IAPs the following standard safety requirements have been achieved:

- The IAPs were designed according to the requirements of ICAO Doc 8168 and CAP785.
- The IAPs were designed by a procedure designer (in this case gCAP), trained according to formal training courses and approved by the CAA in accordance with CAP 785.
- Aerodrome obstacle surveys were completed in accordance with CAP 232

The following design principles were applied:

- Terrain clearance over the Preseli Hills.
 - Minimised over-flights of built-up areas to the maximum extent.
 - Avoidance of the danger areas surrounding West Wales Airport.
 - Avoidance of the danger areas along the South Pembrokeshire coast.
- **Safety Case** – The main aim of the Haverfordwest Safety Case has been to document the evidence that the GNSS approach procedures to Haverfordwest Aerodrome are acceptably safe.

The Safety Case concludes that the mitigations provided by the implementation of the Safety Requirements detailed within the Safety Case will ensure that the operation of the IAPs will be acceptably safe in the Haverfordwest traffic environment and that risks have been reduced to As Low as Reasonably Practical “ALARP”.

The Safety Case for the Instrument Approach Procedures, including the compliance with the framework set out in CAP 1122, has been submitted to CAA as a supporting document for the CAP 1122 Questionnaire on the CAA Bow Tie server.

1.6.2 Safety in surrounding airspace

During the HAZID meeting the Fly Wales Chief Pilot considered that the risk of Mid Air collision was remote due to the low number, and nature of the traffic in the surrounding airspace.

Due to the location of Haverfordwest on a peninsula in the extreme South West of Wales with sea to the North, West and South, there are few aircraft operating at levels that would come in close proximity to the Haverfordwest IAPs.

It was noted in particular that following the closure of RAF Brawdy near St Davids and RAF Chivenor in North Devon, there is very little low-level military activity in the region with the military traffic being further to the east and within the Danger Areas.

To validate the assertion that the low-level airspace surrounding the IAP has low traffic densities, the project has sampled traffic in the locality on the NATS Airspace Explorer application over a number of months.

Airway is L9 aligned on the axis of the STU and BCN VORs passes over the Haverfordwest 21 Initial Approach segments, although the L9 base is FL145, the majority of traffic is in the upper airspace (above FL245) where a number of routes converge on the STU VOR.

All of the traffic that was observed at heights that could conflict with the IAPs were operating out of, or into, Haverfordwest, this includes both aircraft based at Haverfordwest and visiting aircraft.

On the rare occasions when passing aircraft en-route to Ireland that were operating outside of Controlled Airspace were observed these aircraft were transiting the Haverfordwest area typically at FL100.

Other sources of information associated with airspace risk in this area have been identified and reviewed.

FASVIG

The FASVIG 'Register of VFR Significant Areas' (VSA) has identified the "South Wales - West Wales Route". The Haverfordwest IAP is located in the West of this area. The VSA notes the following in respect of VFR traffic in the area:

- This corridor is frequently used by traffic transiting to/from Cardiff, St Athan, Swansea, Pembrey, Haverfordwest, West Wales, English and Irish airfields and grass strips avoiding the high ground to the north and military danger areas/Bristol Channel to the south.
- This VSA is of particular importance to VFR aircraft transiting to/from Ireland and England.
- The bulk of aircraft using this corridor are not competitive as they use it to transit to/from local airfields, Ireland and England; often refuelling or taking a rest break.
- Modest traffic to the west, busier in the east where funnelled by high ground to the north.

The observations of VFR traffic undertaken by the project in the vicinity of the Haverfordwest IAP, are consistent with the points extracted from the VSA in this area.

In particular:

- The importance of Haverfordwest aerodrome to Irish operators is consistent with the three supportive responses to the airspace consultation for the implementation of the IAPs from Ireland.
- The observations confirm that the majority of traffic in the region of the IAPs operate into or out of Haverfordwest. "they use it to transit to/from local airfields, Ireland and England; often refuelling or taking a rest break".
- The statement "Modest traffic to the west" is consistent with the 7018 movements at Haverfordwest in 2016 (approx. 20 per day).

Lower Airspace Radar Service (LARS)

There is no LARS provision in the area surrounding Haverfordwest and as such this suggests that the risk associated with operation in the lower airspace within this region do not justify the provision of a LARS.

The CAA update to the '2013 LARS Review'¹ notes: "Whilst defining and recording 'risk' in Class G airspace is exceptionally problematic, airprox reports can be used to identify specific locations where there was a 'risk of collision' or where 'safety was not assured.'"

This report proposes *"Using airprox reports to form a risk-based assessment it can be ascertained whether the current construct of [LARS] units..."*

The project has assessed available sources of airprox information.

¹ Update of the 2013 Lower Airspace Service (LARS) provision review CAA SARGG 04/02/2017

AIRPROX Reports

Figure 4 depicts geographical locations of airprox incidents between 2000 and 2018.

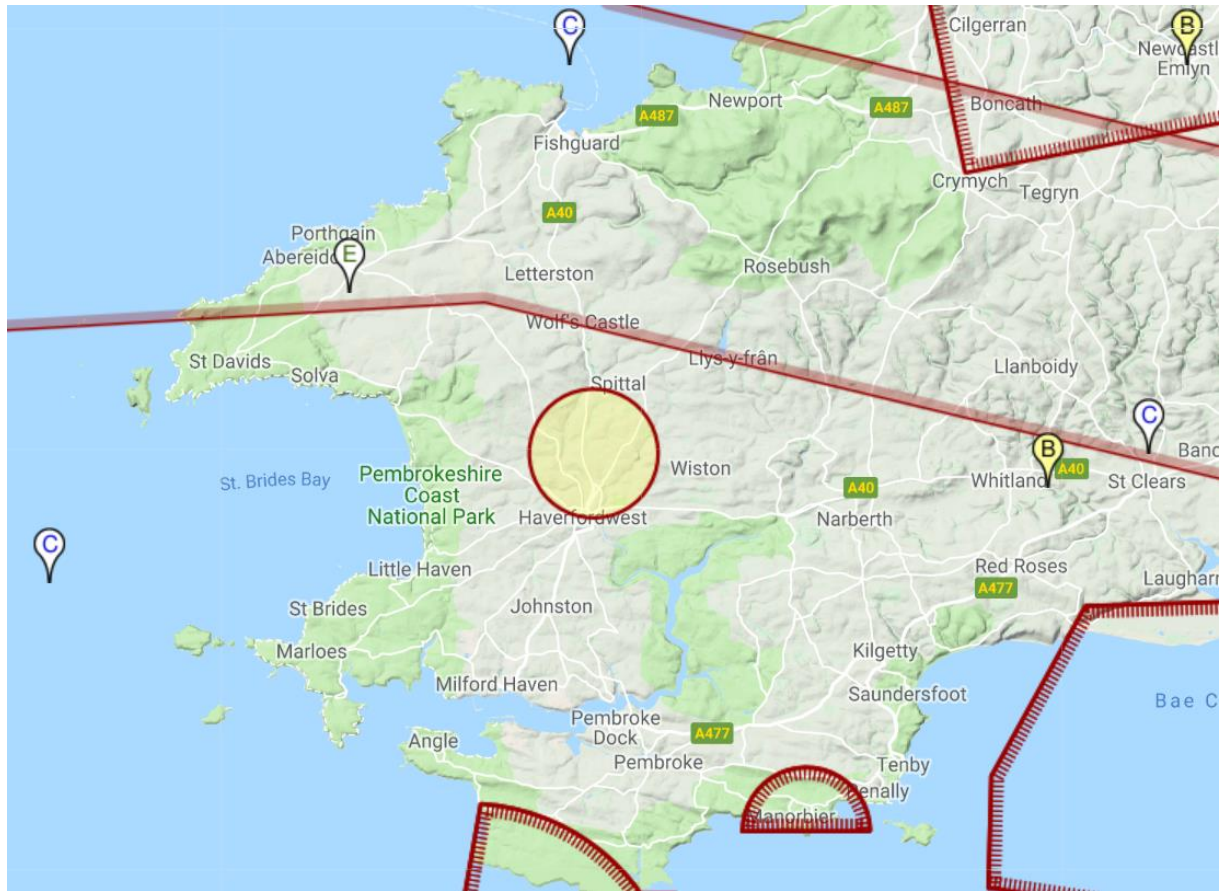


Figure 4: The geographical location of airprox incidents (2000-2018) in the vicinity of Haverfordwest aerodrome

These Airprox Reports are summarized in the following table.

Date	Risk	Height	Civil/Mil	Aircraft Types	Ref	
14/05/2001	C	3000' -FL79	C/C	ATR42-Sundowner	2004075	IFR/VFR
19/02/2002	B	<3000'	C/M	BO105-Jaguar	2002143	VFR/ VFR
16/09/2002	B	<3000'	C/M	C172-Hawk	2002177	In LFA
09/02/2004	C	Upper L9	C/C	B777-MD11	2004166	IFR/IFR
16/01/2006	C	UL607/UP4	C/C	B777-B737	2006003	IFR/IFR
17/01/2012	E	5/600'	M/C	C130-AS355	2012008	VFR/ VFR

Table 1: Details of airprox incidents in the vicinity of Haverfordwest aerodrome

Analysis of airprox reports in the vicinity of the Haverfordwest IAPs indicates:

- Two of the six airproxes involved large civil aircraft in controlled airspace.
- Since 2000, there has been no airprox within the Haverfordwest ATZ or in the vicinity of the IAPs.
- Since 2001, three of the four airproxes below 3000' involved military aircraft.
- Since 2002, there has only been one airprox report at low level (5/600') that involved an AS355 Helicopter and a Military C130 transport aircraft.

From the above analysis of available information, the project concludes that traffic levels in the airspace surrounding Haverfordwest aerodrome and the proposed IAPs in VMC is low, with the majority of aircraft operating into or out of Haverfordwest aerodrome, with corresponding low risk of conflict between aircraft when the IAPs are flown with a visual look out for other traffic.

When in IMC, the traffic level is extremely low with a corresponding extremely low risk of conflict between aircraft.

1.7 Airspace and Infrastructure Requirements

The analyses and safety assessments undertaken confirm there is no need to introduce any additional airspace or infrastructure requirements due to the following reasons:

- Haverfordwest aerodrome is situated in an area of low traffic density.
- Low numbers of aircraft are expected to participate in the instrument approaches.
- The CAP 1122 application has proposed layers of mitigations to reduce identified risks to be "As Low as Reasonably Practical" without requiring airspace or infrastructure changes.
- Runway infrastructure is deemed acceptable by aircrew and the Safety Case.
- Feather arrows to be included on VFR charts.

Adjacent Air Traffic Service Units (ATSU) will be aware of the intent of aircraft executing the Haverfordwest IAP through the allocation of an SSR Conspicuity Code.

1.8 Supporting Maps, Charts and diagrams

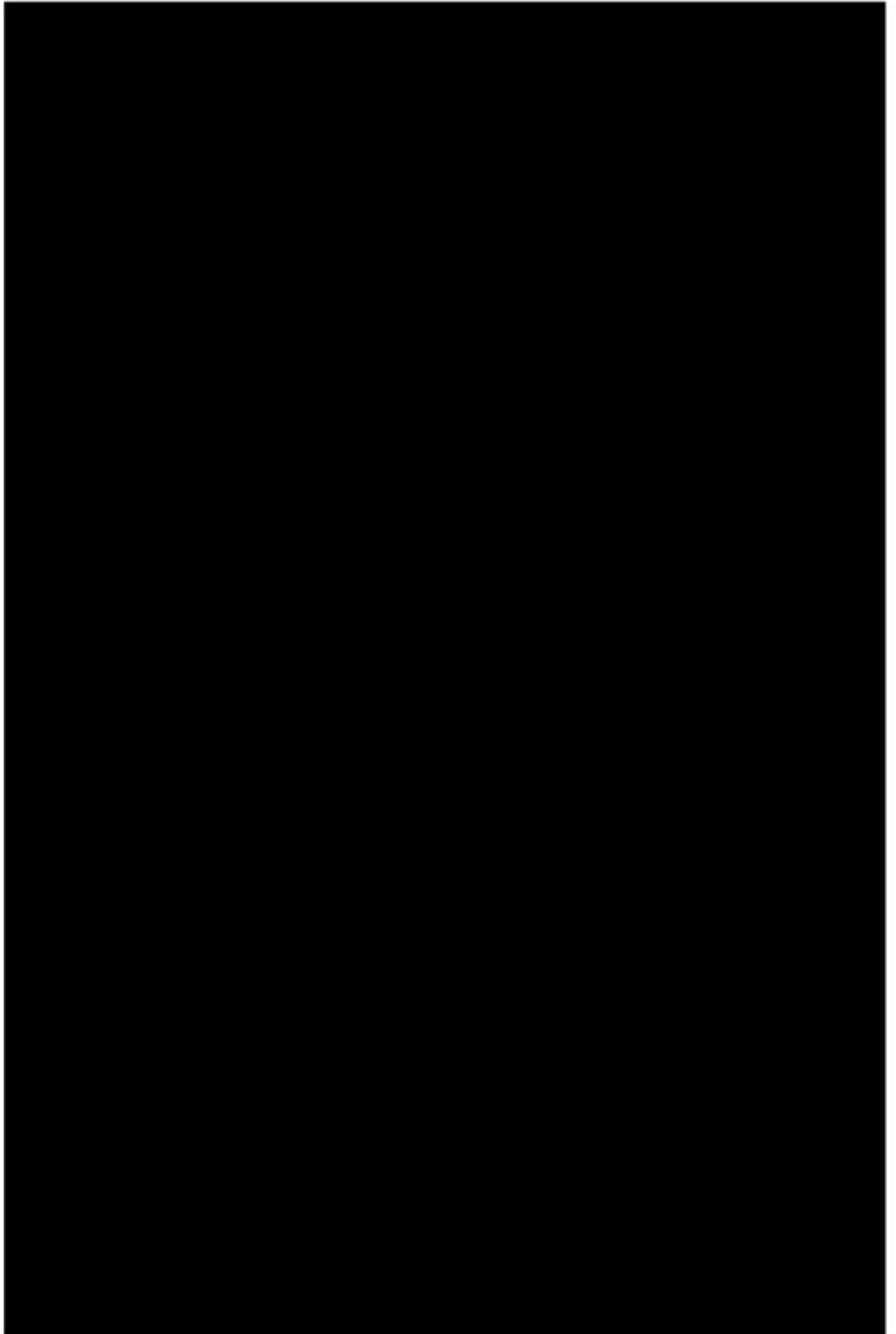


Figure 5: Haverfordwest RNAV GNSS RWY 03 procedures chart

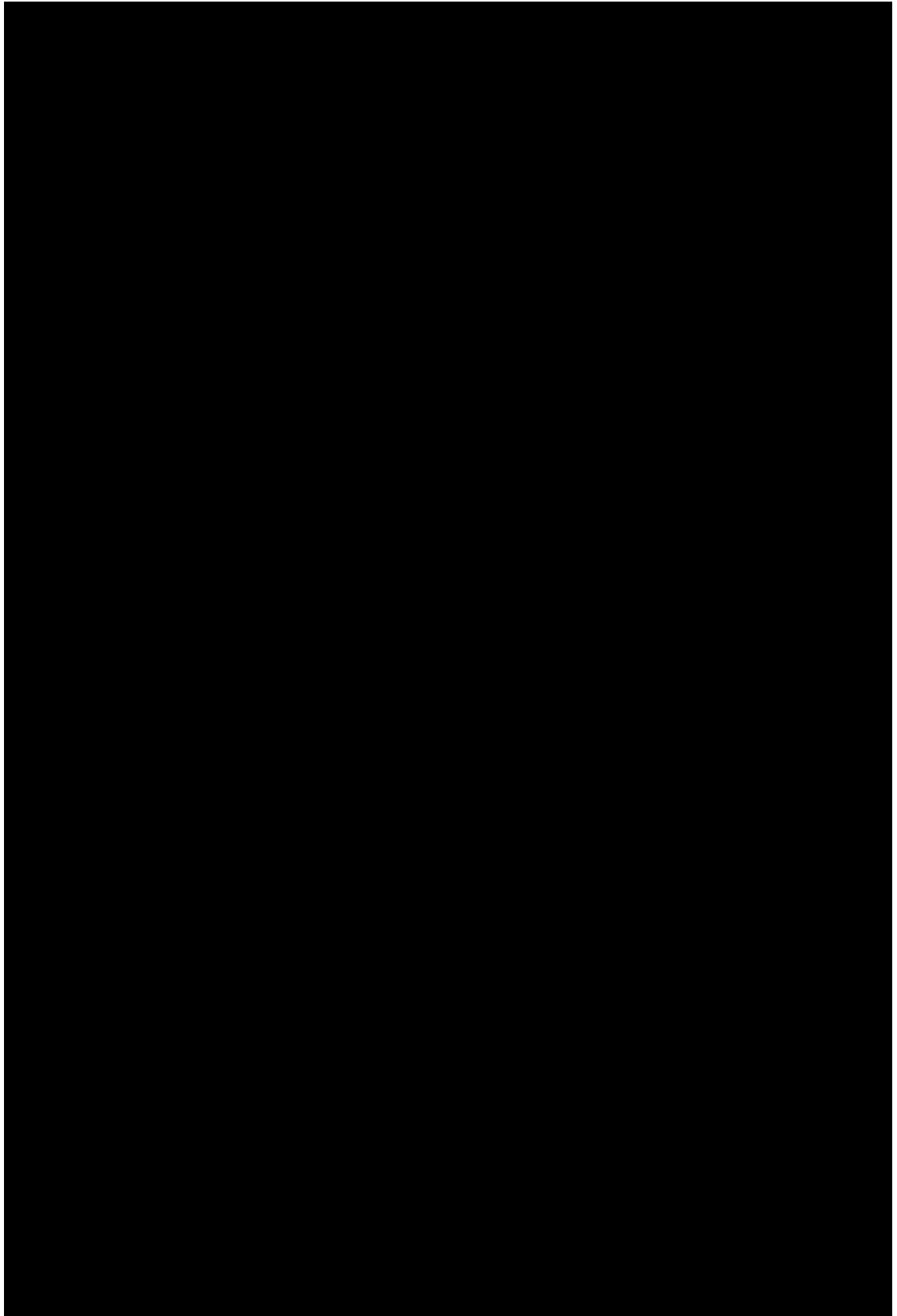


Figure 6: Haverfordwest RNAV GNSS RWY 21 procedures chart

2 Environmental Report

This section presents an Environmental report relating to Implementation of new GNSS IAPs at Haverfordwest aerodrome that are set out in the order below, to address the various areas for SARG assessment as required by CAP 725 CAA Guidance on the Application of the Airspace Change Process:

- i) Description of Airspace Change;
- ii) Traffic Forecast;
- iii) An assessment of the effects on noise;
- iv) An assessment of the change in fuel burn/CO₂;
- v) An assessment of the effect on local air quality; and
- vi) An economic valuation of environmental impact;

2.1 Description of the change

Haverfordwest aerodrome plans to implement GNSS IAPs, with LNAV and LPV minima for aircraft in approach speed categories A and B. These Instrument Approach procedures will enhance the level of safety for IFR arrivals (currently having to transition to VFR and circuit entry) and will allow aircraft to conduct an approach to Haverfordwest in weather conditions not currently possible under VFR.

2.2 Traffic forecast

Haverfordwest Aerodrome is classed as a general aviation aerodrome as it does not have any scheduled commercial services. However, it is used by a variety of aircraft operators. Broadly, these are; Commercial, General Aviation (recreational), Executive, Helicopter and Training. Note, all movements reported in the charts below are VFR only and one movement is counted as an arrival or departure.

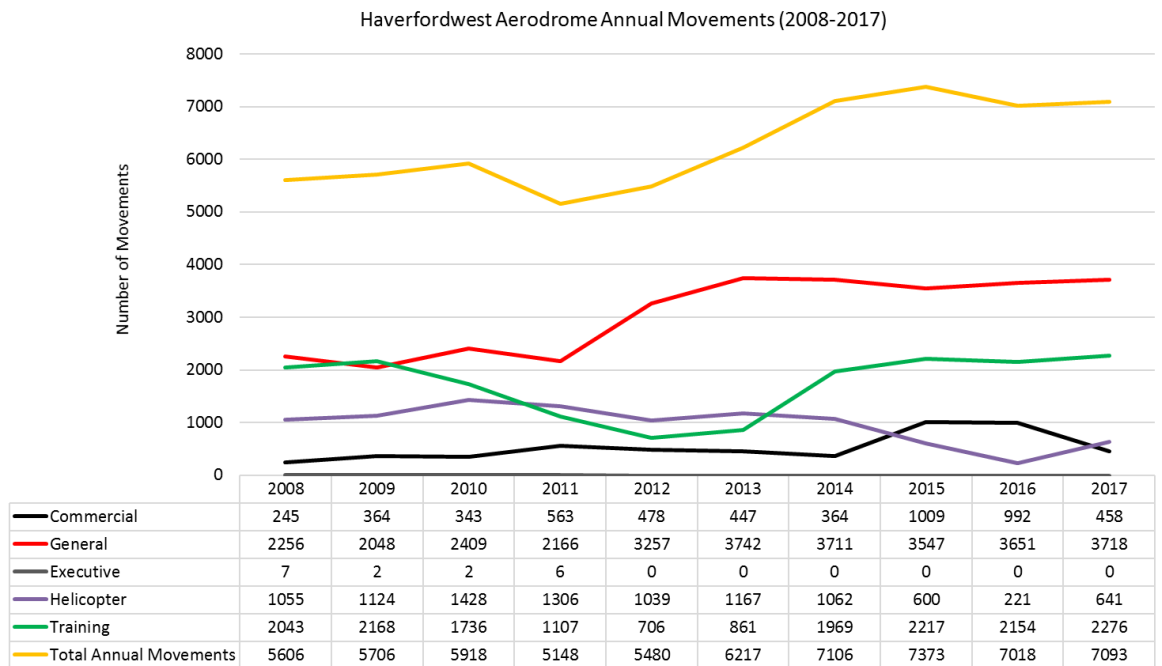


Figure 7: Haverfordwest aerodrome annual movements (2008-2017)

Figure 7 describes the change in the number of annual traffic movements between 2008 and 2017 for the five common types of operations. Overall, annual traffic at the aerodrome has increased by 3% per year however in 2011 and 2016 annual traffic decreased when compared to the previous year. In 2017 annual traffic increased by 1% when compared to the year 2016.

The aerodrome is primarily used for recreational flying by general aviation (around 51% of annual traffic) and has slowly grown and stabilised over recent years. The remaining significant attributors to movements are training flights (31%) which have recovered to similar levels of activity as experienced in 2008 and commercial flights (14%) which have experienced recent growth since 2015.

General aviation and training operations are expected to remain the primary operations at the aerodrome, both supporting the economic viability and sustainability of the aerodrome remaining operational.

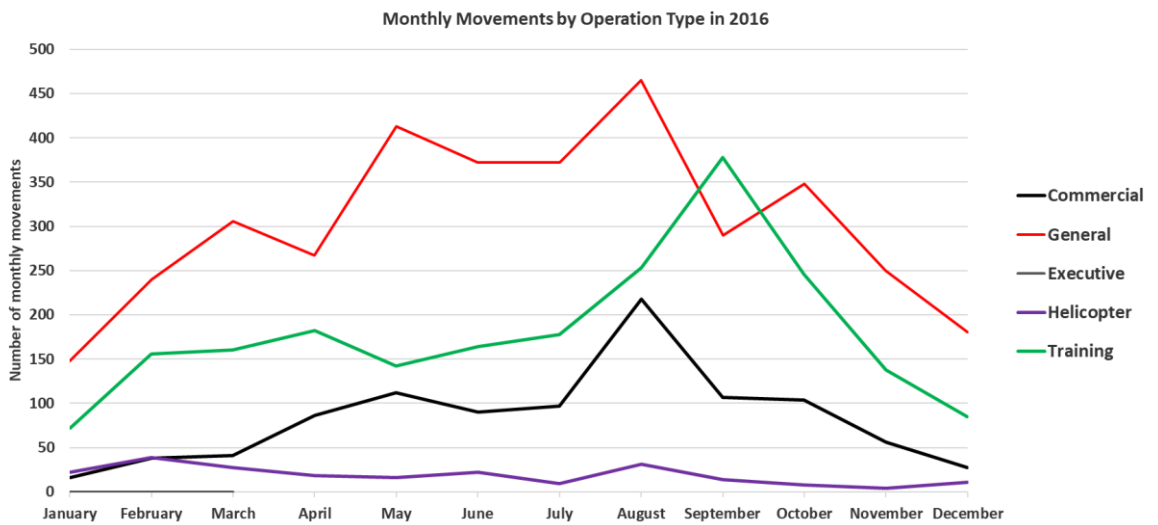


Figure 8: Monthly movements by operation in 2016

Haverfordwest Aerodrome handled a total of 7,018 movements in 2016. This equates to an approximate daily average of 20 movements a day.

Based on 2016 data and factoring in growth related to IFR traffic, it is estimated the proposed approach will make up 220 of the annual arrival movements (3,509) to runway 03 and 21. This is approximately equivalent to less than 1 per day. In other words, every 1 in 16 approach movements are expected to be capable of flying the proposed instrument approach. In practice, the volume of visual and instrument approaches will not be evenly spread throughout the year as their use will vary depending on prevailing weather conditions and visual traffic density, as shown in Figure 8.

It is expected that 6% of arriving flights to Haverfordwest will be able to use the proposed instrument approaches to runway 03 and 21, with the remainder using the conventional visual approaches. However, it is acknowledged by Haverfordwest Aerodrome that having these more accurate procedures in place may encourage aircraft operators to land at Haverfordwest Aerodrome rather than looking further afield when planning their flights. The availability of the instrument approaches (if the proposal is accepted) are not expected to increase VFR movements but a small increase of less than 1 flight per day is anticipated from IFR traffic.

2.3 Assessment of the noise impact

The Consultation Document included an analysis of traffic numbers and likely noise impacts in specific segments of the approach as identified in figure 10. This analysis is presented in Tables 2 and 3 below.

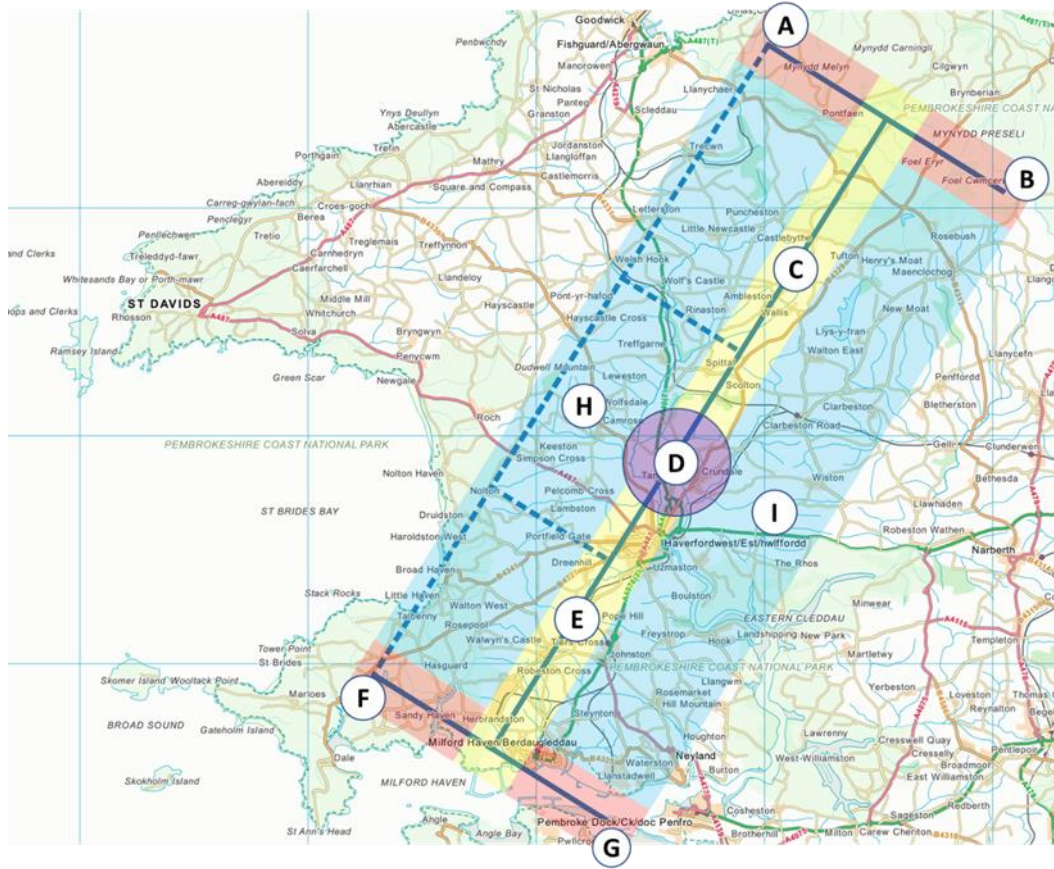


Figure 9: Map of areas impacted by instrument approach

Table 3 describes the impact in areas A to I in terms number of aircraft and noise.

Indicator	Impact
	We estimate a net reduction of noise or aircraft numbers.
	We estimate a net increase of noise or aircraft numbers.
	We estimate no change of noise or aircraft numbers.

Table 2: Key to Symbols used in Table 2

Region	Impact	Category	Rationale (Change to current day visual operations)
A		Noise	Aircraft will be flying higher (minimum 2900ft) when compared to an aircraft on a similar track flying to the aerodrome visually.


















Region	Impact	Category	Rationale (Change to current day visual operations)
		No. of aircraft	55 aircraft per year are estimated to route through the area. This is estimated to be greater than today since aircraft are being routed through A rather than flying directly to the aerodrome.
B		Noise	Aircraft will be flying higher (minimum 2900ft) when compared to an aircraft on a similar track to the aerodrome visually.
		No. of aircraft	10 aircraft per year are estimated to route through area. This is estimated to be same as today.
C		Noise	Aircraft flying the instrument approach will be higher and descending on lower power setting than an aircraft approaching the aerodrome visually.
		No. of aircraft	213 aircraft per year are estimated to route the area. This is estimated to be greater than today since aircraft are being routed through A and B rather than flying directly to the aerodrome.
D		Noise	No change to current noise in the ATZ as traffic patterns are not changing.
		No. of aircraft	No perceptible change to number of aircraft in the ATZ since the majority (~ 94%) of movements approach visually.
E		Noise	Aircraft flying the instrument approach will be higher and descending on lower power setting than an aircraft approaching the aerodrome visually.
		No. of aircraft	24 aircraft per year are estimated to route through area. The proposed instrument approach is not expected to significantly alter the current traffic flows.
F		Noise	No perceptible change in noise as area rarely used by aircraft.
		No. of aircraft	4 aircraft per year are estimated to route through area. The proposed instrument approach is not expected to significantly alter the current traffic flows.
G		Noise	No perceptible change in noise as current aircraft route over the estuary south of Milford Haven.
		No. of aircraft	18 aircraft per year are estimated to route through area. The proposed instrument approach is not expected to significantly alter the current traffic flows.
H		Noise	No perceptible change in noise since use of the missed approach is will be rare and visual operations currently dominate the area.
		No. of aircraft	17 aircraft per year are estimated to route through area. This is estimated to be same as today.
I		Noise	Slight decrease in noise as aircraft are routed through areas B and G.
		No. of aircraft	No perceptible change in aircraft numbers due to dominance of aircraft manoeuvring visually.

Table 3: Qualitative assessment of areas impacted by instrument approach procedures

The introduction of the Haverfordwest instrument flight procedures provides a defined ground track that will concentrate aircraft on a repeatable track over the ground. This concentration of traffic will result in a small increase in traffic and noise in certain areas.

However, these changes are unlikely to be perceptible due to the low numbers of aircraft participating in the procedure.

No comments on aircraft noise were submitted during the consultation.

The introduction of the approach to runway 21 will not overfly the riding stables and residence that are the subject of the Noise Abatement Procedures promulgated in the UK Aeronautical Information Publication (EGFE AD 2.21).

Haverfordwest Aerodrome concludes that in some areas there may be small, but imperceptible increases in noise from aircraft participating in the Instrument Approaches, although as Haverfordwest Aerodrome does not expect a significant increase in numbers of aircraft or a change in aircraft types using the aerodrome, there is likely to be a noise reduction in other areas.

2.3.1 Air Navigation Guidance 2017 (ANG 2017)

Following the Department for Transport issuing the 2017 Air Navigation Guidance Material, the CAA wrote to Haverfordwest on 6 April 2018, advising:

“... Ministers have come to the view that ongoing airspace change proposals which had commenced their consultation by 2 January 2018 or which would have done but for the Christmas period, and whose noise impact currently affects less than 10,000 people in the standard 54dB LAeq 16 noise contour, should be allowed to continue to follow the 2014 Air Navigation Guidance.

As a consequence, in order to apply ANG 2014 to your proposal when it is submitted to us for a decision the CAA will need to be satisfied that your airports current noise impact affects less than 10,000 people in the standard 54dB LAeq 16 noise contour.

We write to advise you that you must prepare a 54dB noise contour map to enable us to determine whether your airport current noise impact is below that threshold and so your proposal when submitted will be assessed against ANG 2014 and CAP 725 (or not) or some other suitable means of making this assessment which is acceptable to the CAA. “

In the absence of having a standard 54dB LAeq 16 noise contour map specific to Haverfordwest, an extremely conservative contour was prepared by Pembrokeshire County Council with data from their housing database to assess the number of properties that would be impacted by the assumed contour.

This assessment is presented in Figure 10 below.

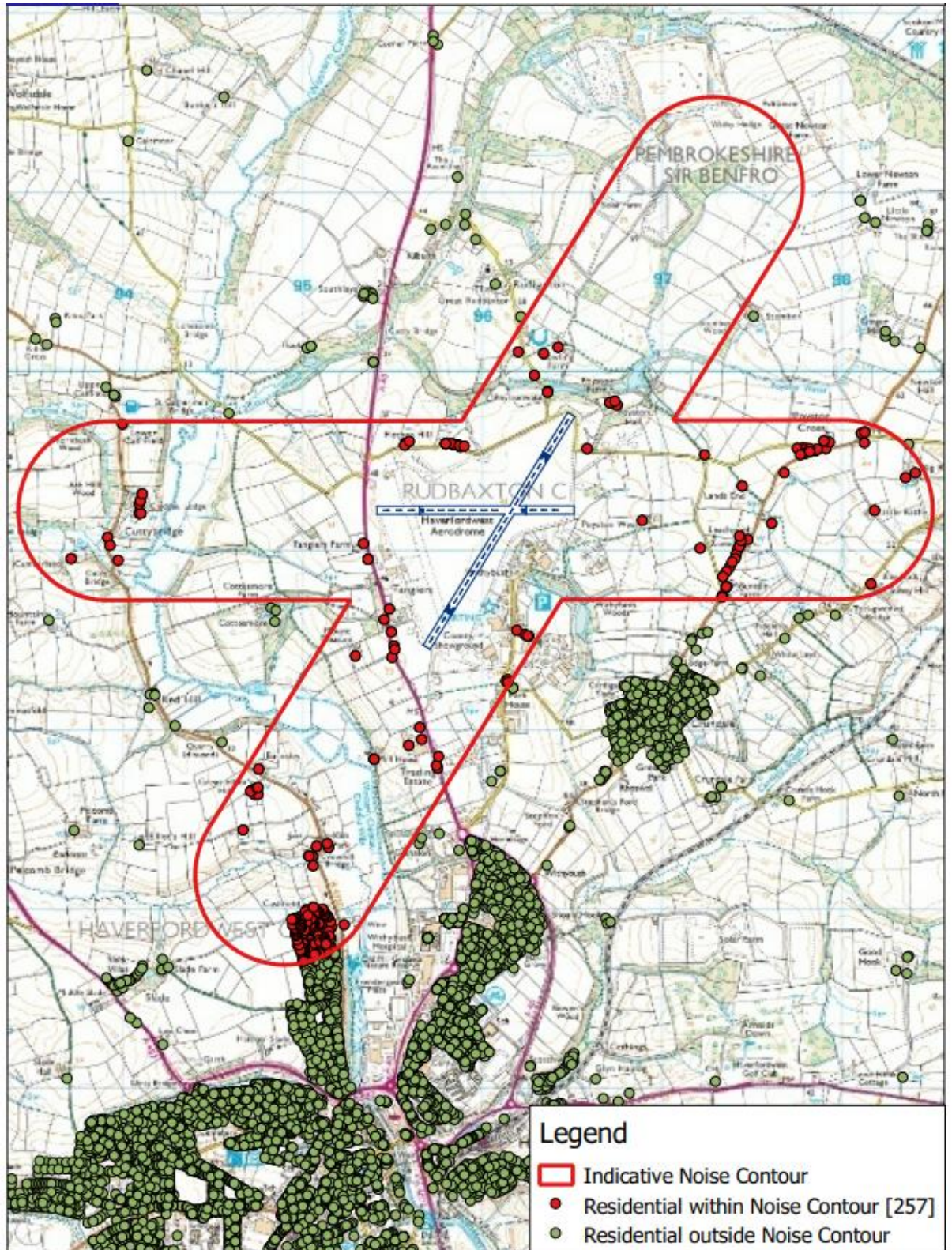


Figure 10: Proposed IAPs noise impact contour map

The conclusion of the assessment undertaken by Pembrokeshire County Council is that there are 257 residential properties inside the 'assumed contour'. The average household size for Pembrokeshire is 2.3 persons, equating to 591 people being contained within the contour.

2.4 An assessment of the change in fuel burn and CO₂ emissions

Following engagement with the aerodromes key aviation stakeholders, (i.e. pilots, airspace users and airport operations staff) there is a consensus that the proposal will allow aircraft to fly a stabilised approach with lower engine power settings. The current approach to Haverfordwest requires pilots to follow a visual approach into the aerodrome. Once the pilot has the aerodrome in sight, they make a turn to align with the runway. When an aircraft begins to turn, a higher engine power setting may be required to maintain airspeed, resulting in an increase in fuel burn, leading to increased CO₂ emissions and noise. The instrument approaches proposed are aligned with the runway and allow aircraft to complete the approach with minimal alteration to direction of travel or engine power settings. This stabilised approach will allow pilots to configure the aircraft more efficiently and potentially minimise fuel burn, CO₂ and noise during the approach. The fuel savings from lower power settings are offset against an average increase in track mileage of around 4.5 NM for an aircraft to fly the instrument approach.

From the quantitative perspective, as historic METAR data was not available for Haverfordwest, data was analysed from Pembry, the nearest aerodrome for which METAR data was available. Over the period 2015 to 2018, this data showed that clouds occurred below 1,200' approximately 44% of the time. In addition, it was Overcast (OVC) approximately 15% of the time, meaning that overall there is approximately a 7% probability that an aircraft flying VFR to Haverfordwest would have to divert another aerodrome. In most cases an aircraft would divert to Cardiff, as the nearest location with an Instrument Landing System.

Historic flight plan data shows that in excess of 80% of IFR flights at Haverfordwest will be conducted by Beechcraft Super King B200 aircraft, the 176 flights per year, result in annual CO₂ emissions of approximately 16,632 kg if all fly the proposed IAP.

Analysis of current VFR flights, assuming that a visual approach is on average 4.5 NM shorter than the instrument approach, indicates that the resulting CO₂ emissions per year is lower than with the proposed IAP by about 56% (5,280kg).

From analysis of the MET data, out of the 176 VFR flights, approximately 7% (12 flights) would result in diversion to another aerodrome. This would result in additional CO₂ emissions of 6,914kg. Therefore, under the current VFR operations, the total CO₂ emissions is 17,559kg, which is around 5.6 % higher than with the proposed Instrument Approach Procedures.

2.5 An assessment of the effect on local air quality

Haverfordwest aerodrome has concluded that there will be negligible change in air quality as any increase in CO₂ emissions will be dissipated along the length of the Instrument approach and there are not expected to be significant increases in aircraft movements as a direct result of the proposed approach procedures.

2.6 An economic valuation of environmental impact

An economic valuation of environmental impact has not been included within this proposal as there will be no significant impact on the overall CO₂ emissions from this proposed change.

A Abbreviation

Abbreviation	Definition
ACP	Airspace Change Proposal
AIP	Aeronautical Information Publication
AOPA	Aircraft Owners and Pilots Association
APAPI	Abridged Precision Approach Path Indicator
ATC	Air Traffic Control
ATZ	Aerodrome Traffic Zone
ATSU	Air Traffic Service Unit
CAP	Civil Aviation Publication
CO ₂	Carbon dioxide
DME	Distance Measuring Equipment
DOC	Designated Operating Coverage
ft	feet
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HAZID	Hazard Identification
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
KIAS	Knots-Indicated Air Speed
LAeq	Equivalent Continuous Level
MAP	Missed Approach Point
MET	Meteorology
NDB	Non-Directional radio Beacon
NM	Nautical Mile
OVC	Overcast
PCC	Pembrokeshire County Council
PPR	Prior Permission Required
RFF	Rescue and Fire Fighting
RWY	Runway
SARG	CAA Safety & Airspace Regulations Group
SMS	Safety Management System
UKAB	United Kingdom Airprox Board
VFR	Visual Flight Rules
VPA	Vertical Path Angle

B Kingair Fuel Burn and Emissions Analysis

Baseline - current VFR procedure			New IFR procedure		
Parameter	Value	Unit	Parameter	Value	Unit
Number of VFR movements per year	176		Number of IFR movements per year	176	
Track miles per approach Haverfordwest	8	NM	Track miles per approach Haverfordwest	12.5	NM
Average fuel burn per min (approach)	5.6	kg/min	Average fuel burn per min	5.6	kg/min
Average approach speed	140	kts	Average approach speed	140	kts
Average approach speed	259	km/h	Average approach speed	259	km/h
Average time per approach	3.4	min	Average time per approach	5.4	min
Average fuel burn per approach	19	kg	Average fuel burn per approach	30	kg
Fuel burn per year	3,379	kg	Fuel burn per year	5,280	kg
CO₂ emissions per year	10,644	kg	CO₂ emissions per year	16,632	kg
Number of VFR movements per year	12.32				
Track miles per diversion to Cardiff	115	NM			
Average fuel burn per min (cruise)	5.4	kg/min			
Average diversion speed	240	kts			
Average diversion speed	444	km/h			
Average time per diversion	28.8	min			
Average fuel burn per diversion	154	kg			
Fuel burn per year	1,899	kg			
CO₂ emissions per year	5,983	kg			
Number of VFR movements per year	12.32				
Track miles per approach (Cardiff)	10	NM			
Average fuel burn per min (approach)	5.6	kg/min			
Average approach speed	140	kts			
Average approach speed	259	km/h			
Average time per approach	4.3	min			
Average fuel burn per approach	24	kg			
Fuel burn per year	296	kg			
CO₂ emissions per year	931	kg			
Total CO₂ emissions per year	17,559	kg			