

SYWELL INSTRUMENT  
APPROACH PROCEDURES  
AIRSPACE CHANGE PROPOSAL

VERSION 1.1 – ISSUED – JUNE 2017



## 1 Executive Summary

Sywell Aerodrome is a long established and well run general aviation facility in Northamptonshire. It plays host to a small number of commercial operators, two flying schools and several privately-owned aircraft. The introduction of instrument approach procedures at Sywell would benefit the commercial operators, increasing productivity through more reliable operations from their base at Sywell.

The publication of the CAA document CAP1122, with its risk based assessment, has provided opportunity for Sywell Aerodrome to apply for the introduction of instrument approaches without an approach control service operating at the airfield. This proposal presents outline designs for simple GNSS based instrument approach procedures.

This document assesses the benefits and impacts of the introduction of instrument approach procedures within the framework of our current aerodrome operations and concludes that there are worthwhile benefits to the operators based at Sywell Aerodrome with negligible impacts to either the environment or other airspace users.

This document follows an Airspace Change Proposal (ACP) framework briefing and initial guidance from the CAA with regard to the application.

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## 2 Sywell Aerodrome

Sywell Aerodrome is a licensed aerodrome located in the village of Sywell 5 miles north east of the town of Northampton. The aerodrome has been established at Sywell since 1928 and is one of the oldest privately owned airfields in the country.



*Figure 1: Sywell Aerodrome Aerial View*

The aerodrome benefits from a single all-weather runway and three grass runways. Open daily all the year around, the aerodrome provides an AFISO service along with Category II RFFS cover. The aerodrome sees annual traffic volumes of circa 35,000 movements each year, with weather being a significant factor in reducing aerodrome activity. Recent infrastructure upgrades have included high intensity aerodrome ground lighting and additional hangar buildings. Sywell has 125 resident aircraft and two significant commercial operators, 2Excel Aviation and Sloane Helicopters.

2Excel Aviation have a fleet of ten Piper Navajo and three Beech King Air 200 aircraft which are engaged in trials, survey and charter operations. In addition to these operations 2Excel Aviation also operate the very popular “The Blades” formation aerobatic team

Sloane Helicopters are an authorised distributor for Leonardo Helicopters (formerly AgustaWestland) and the Robinson Helicopter Company. Their activities include helicopter training and charter along with the operation of three regional air ambulance services.

### 3 Rationale & Constraints

The application for instrument approach procedures at Sywell Aerodrome is being made to safely make the aerodrome more reliably accessible during periods of reduced cloud ceiling and or visibility for our based commercial operators and corporate visitors. The procedures will only be made available to pre-booked traffic during normal operating hours. It will not be feasible to accommodate pop-up opportunistic traffic, however aircraft declaring an emergency would be offered every assistance.

The application has not been made with the intention of making the procedures available for initial instrument training activities (e.g IR(R) ratings) as the intended PPR system will require a cessation of all other movements. We consider that the business impact of lost revenue by ceasing operations for extended periods to accommodate training flights is not commercially viable.

### 4 Environmental Aims

Sywell Aerodrome has long understood its obligation to minimise the environmental impact of its operations. Whilst planning for the application we established that the introduction of Instrument Approach Procedures should have a marginally lower or no measurably worse an environmental impact than current operations. This is borne out by our proposals notably under Noise, Visual Intrusion and CO<sub>2</sub> Emissions in Paragraph 12.

### 5 Operator Engagement

During the pre-application preparation work we engaged with the main based operators to establish the benefits of introducing instrument procedures at Sywell.

#### 2Excel Aviation

A significant part of the 2 Excel Aviation business is to perform airborne trials contracts on behalf of technology firms and defence contractors. These trials which consist of a set programme of flights that are often booked many months in advance to meet testing and production schedules. The trials are flown over an allotted period of perhaps two weeks, which is fixed. If the weather conditions preclude flying on a particular day, those tasks must still be completed leading to more intensive operations on other days. In order to adhere to the schedules, it is often the case that trials aircraft will depart from Sywell and then recover after flying an approach to the nearby Cranfield Aerodrome which has a published ILS approach, to become visual with the ground and return to Sywell at low level visually.

The key benefits of instrument approach procedures for their trials process will be to reduce weather dependency allowing for a more even distribution of flights over the trial period and removing the need to use a remote instrument procedure with its associated low-level transit.

#### Sloane Helicopters

As part of their varied business activities, Sloane Helicopters operate three regional air ambulance helicopter services. The aircraft are used for both emergency (HEMS) and medical transfer (MEDEVAC) flights. All of the helicopters used to provide these services are maintained at Sywell Aerodrome. When operating in the MEDEVAC role, the aircraft transport patients from hospitals such as Sheffield and Leeds to specialist units at London based hospitals, often for potentially life-saving surgery. The distances involved frequently require refuelling en-route and given its geographic position, along with the pilot's familiarity with the location, Sywell is often chosen for rapid rotors running refuelling.

The key benefits of instrument approach procedures to the air ambulance operations will be the ability to pre-plan refuelling stops with an increased level of certainty and to ensure that positioning flights are able to proceed to allow the aircraft to be maintained without impacting on their HEMS duties.

## 2 Excel Training and Brooklands Flying Club

The flying schools have been consulted regarding the policy to restrict the use of the instrument approach procedures, denying their use for initial instrument training flights. The impact of this policy on school operations will be negligible as their core business activities are ab-initio PPL training.

## **6 Traffic Types**

There are five distinct types of traffic that regularly use Sywell:

- Single engine piston aeroplanes under 2000kg MTOW including SEP, SLMG, Microlight and SSSDR classes
- Twin engine piston aeroplanes - Piper PA31 Navajo and similar
- Twin engine turbine aeroplanes - Beech 90 and 200 King Air Series
- Piston engine helicopters - Robinson R22 and R44
- Turbine engine helicopters - AW109, Hughes 500, Bell Jet Ranger

In addition to the main traffic types, a small number of movements annually are made by Very Light Jet aircraft under 5000kg MTOW, such as the Cessna 510 Mustang series.

There are 125 aircraft resident at Sywell, with the vast majority operating on a permit to fly or are otherwise restricted to day VFR operations. Of these there are 31 resident aircraft certified for IFR operations but only a limited subset of these aircraft have the necessary equipment fitted to make use of an RNAV (GNSS) approach. Furthermore, some of the pilots of these a/c may not be rated to fly with sole reference to instruments.

## **7 Traffic Volumes**

The total annual number of aircraft movements is 35,000 which includes private leisure flights, flying school training flights and commercial flights by based and visiting operators. Aerodrome activity reduces significantly as the weather deteriorates. In 2016 the aerodrome experienced more than 50 days where the total number of movements recorded was less than 15. The table below details the average traffic volumes (2013-2016) for those aircraft likely to make use of the procedures after implementation.

Aircraft Type	Annual Movements	Monthly Average
Fixed Wing - Twin Piston & Turbo Prop	456	38
Turbine Helicopters	240	20
Fixed Wing - Jet	8	< 1

It is estimated that the introduction of instrument procedures will lead to a rise in the movements of circa 500 extra per year, which will be generated mostly by the limited number of commercial operators. It is not expected that the number of movements on poor weather days will rise significantly due to the limited number of commercial operators and suitable equipped aircraft based at Sywell.

## **8 Traffic Mission Profiles**

### **2 Excel Aviation**

2 Excel aviation have two types of activity, trials and survey flights and executive transport. Trials and survey flights are typically A to A flights with varying durations of between 1 to 3 hours. Executive transport flights are A to B flights with a mix of one way and return flights.

### **Sloane Helicopters**

Sloane Helicopters flights are typically HEMS/MEDEVAC flights or maintenance positioning flights.

## 9 Runway Prevalence

Runway 21R is the prevalent runway direction for the proposed instrument runway at Sywell accounting for approximately 65% of the movements on runway 21R/03L.

## 10 Design Criteria

The design criteria were to produce simple PANS-OPS compliant LNAV and LPV procedures without the need to establish a new instrument holding procedure.

An instrument holding procedure was excluded from the design requirement on the basis that the procedure would be used only 2 or 3 times on non-VFR flying days on a pre-booked basis removing the need to queue traffic for the approach a simple T design was felt adequate for the low traffic volumes expected.

Whilst the application for the instrument procedures is being made under the CAP1122, we have been careful to ensure that all physical elements of the application are compliant with relevant standards, excepting the need for approach control.

The guidance provided in CAP1122 has been used to create a safety assurance document to demonstrate that the procedure will be operated in an acceptably safe manner.

## 11 General Impact of the Proposal

The overall impact of the proposal is expected to be low across all areas. This expectation is based on the limited amount of extra activity anticipated once the procedures have been implemented and the similarity to existing VFR operations in terms of ground tracks and overflight heights.

## 12 Environmental impact

We expect that the impact on the environment will be overall positive however is it difficult to quantify the exact improvements due to very small amount of activity related specifically to the introductions of instrument approach procedures

### Noise

Previous noise studies performed during the planning application for the all-weather runway found the noise levels generated by the aircraft movements to be acceptable. The planned flight tracks of the instrument approach procedures will fly over conurbations which are currently overflown by VFR traffic inbound to Sywell with no additional areas affected. (see appendix B for examples)

At the time of the study in 2006 the aerodrome experienced 62,000 movements, by 2016 the number of movements had fallen to 35,000. In 2016 we recorded a total of 14 noise complaints of which just 10 were attributable to Sywell related traffic. With the anticipated increase in movements being in the order of 500 per annum and the reduction of noise foot print by inbound traffic no longer transiting low level and continuous decent operations we do not anticipate any material increase in noise pollution from the introduction of IAPs at Sywell.

### Visual Intrusion

There will be no change in visual intrusion as the aircraft using the instrument approach will follow similar tracks to those currently flown by VFR traffic. (see appendix B for examples).

### CO<sub>2</sub> Emissions

Whilst it is difficult to quantify the exact improvements we expect that there will be a slight reduction in the CO<sub>2</sub> emissions from the aircraft using the instrument approach procedures. The reduction in emissions would come from the reduction of track miles flown by aircraft inbound to Sywell combined

with their ability to stay higher for longer, enabling their engines to operate in a more fuel-efficient manner.

## **Areas of Outstanding Natural Beauty**

There are no Areas of Outstanding Natural Beauty affected by the proposed instrument approach

## **Sites of Special Scientific Interest (SSSI)**

The 2006 environmental impact study commissioned to support our planning application for the all-weather runway established that there were no adverse impacts to any Sites of Special Scientific Interest.

## **13 Local Airspace Impact**

Sywell Aerodrome is located in uncluttered class G airspace without adjacent danger or restricted areas. The nearest aerodromes are Cranfield (15nm), Leicester(20nm), Wittering (22nm) & Coventry (26 Nm). Local controlled airspaces are the Daventry CTA + Airway N57 with the lowest bases high above the aerodrome at FL75. There are no anticipated impacts on the local airspace or its users by the introduction of instrument approach procedures at Sywell.

## **14 Proposed Instrument Approach**

### **Runway 03 Left**

A T-bar arrival structure is proposed due to its simplicity and low airspace consumption. Initial and intermediate segments are supposed to be flown at a minimum altitude of 2300 ft AMSL, whilst the intermediate and final segments of the approach are aligned with the runway centreline.

The final segment is designed with a gradient of 3.5 degrees (6.1%) in order to replicate as much as possible the current VFR operations. Furthermore this angle is consistent with the calibration of the APAPI. Steeper approaches are dismissed due to special approvals associated. TCH of 39 ft is proposed due to runway length. The FAF is set at 2300 ft AMSL, this is translated in a total length of 5 nm. Part of the final segment overflies populated area of Northampton, as today's operation.

The MAPt (LNAV) is proposed over THR03L. The missed approach consists of an initial straight-in segment (aligned with final and RWY centreline) in order to gain altitude. At 3 nm from the MAPt a left turn is proposed for flying direct to an auxiliary waypoint located westbound for flying back to the initial approach fix.

Omnidirectional arrivals altitudes (TAA) are below the IAF altitudes. Hence the connection between the en-route structure and the IAF can be easily established.

### **Runway 21 Right**

The approach for RWY21R mirrors the approach for 03L: T-bar arrivals, 3.5 nm each segment, FAF at 2300 ft AMSL and same TCH and descent gradient for final segment. The altitude of 2300 ft is proposed in order to assure Kettering is flown at or above 2000 ft AGL. The noise impact at this height is considered negligible. Previous proposals proposed to the stakeholders (i.e. with FAF at 1800 ft AMSL) could not guarantee that vertical separation over Kettering.

The essential difference with respect to RWY03L approach is the missed approach. In order to mitigate the noise impact over Northampton, the first straight-in climb is 1.9 nm long. The rest is a replication of the 03L missed approach, designing the desired track westbound the airport for flying back to the initial approach fix.

As per RWY03L, the transition from the en-route structure can be smoothly performed via omnidirectional arrivals (TAA).



# SYWELL AERODROME IAP – AIRSPACE CHANGE PROPOSAL

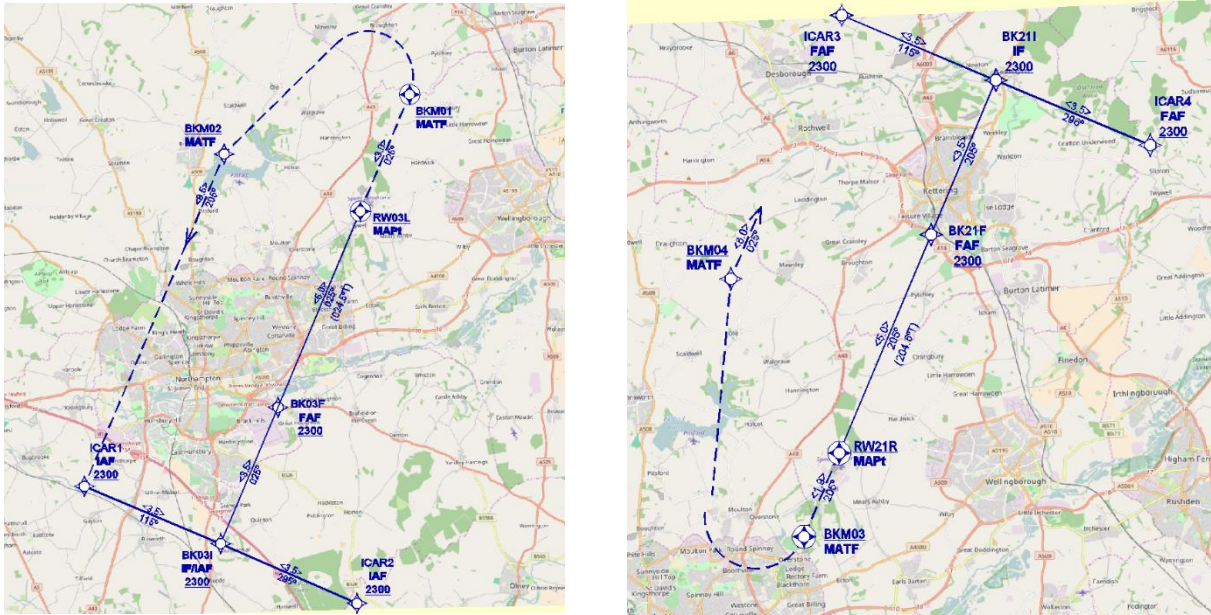


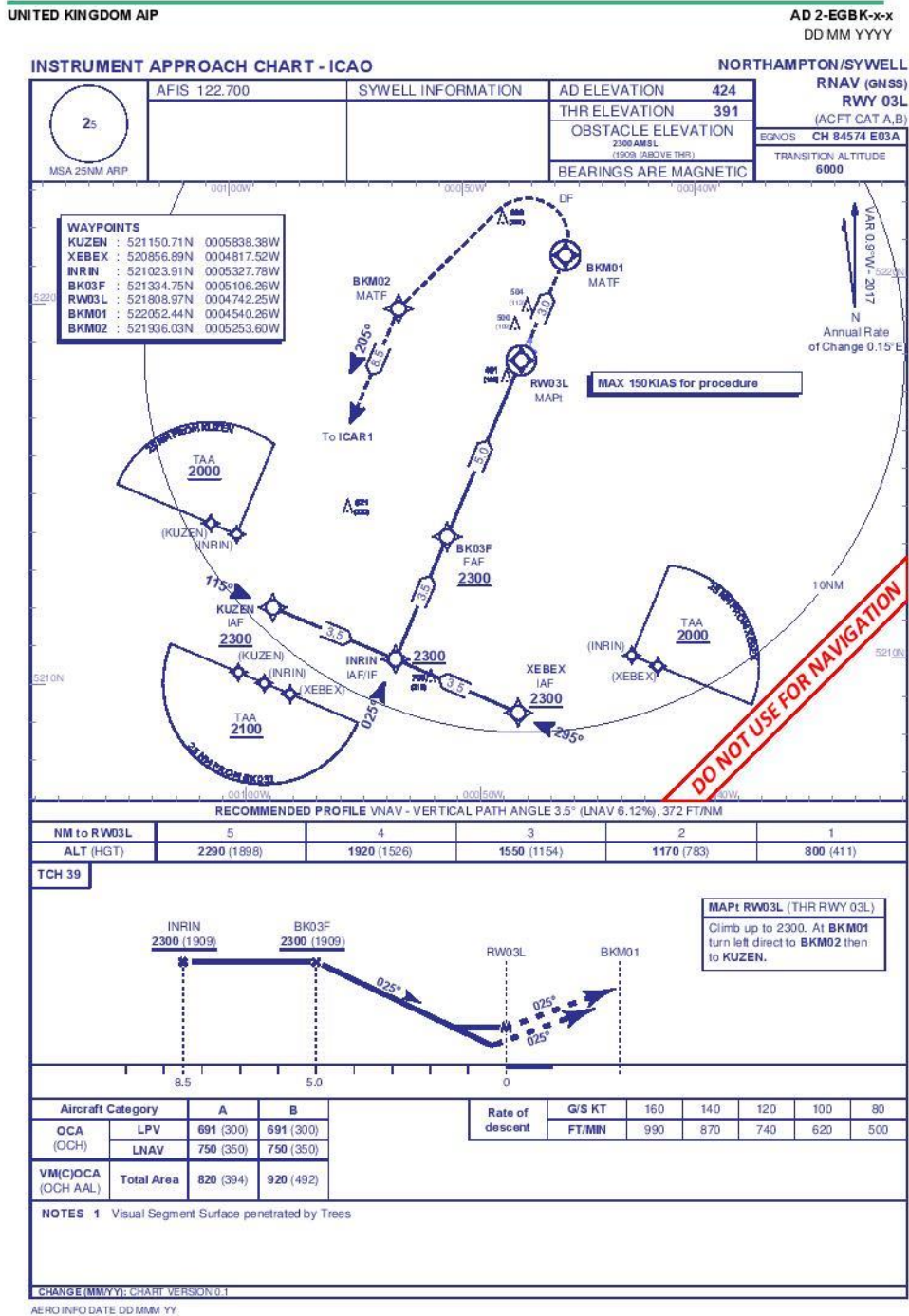
Figure 2: Proposed IAP Layouts

The instrument procedures will only be available to aircraft that have booked in advance, with availability limited to one aircraft within each booking period, negating the need for a holding procedure. It is not envisaged that the approaches will be used for basic training purposes but may be used for recurrent training by the based operators, reducing the need for regular missed approaches to be flown.

The calculated minima for the approaches are below system minima for both LNAV and LPV approaches, however the proposed minima for the IAPs will be in accordance with those published by the CAA for IAPs that terminate at a non-precision instrument runway. The minima to be applied will therefore be 300 feet OCH.

During the design process, different designs have been considered, details of these can be found in appendix C.

Appendix A - Instrument Approach Plates



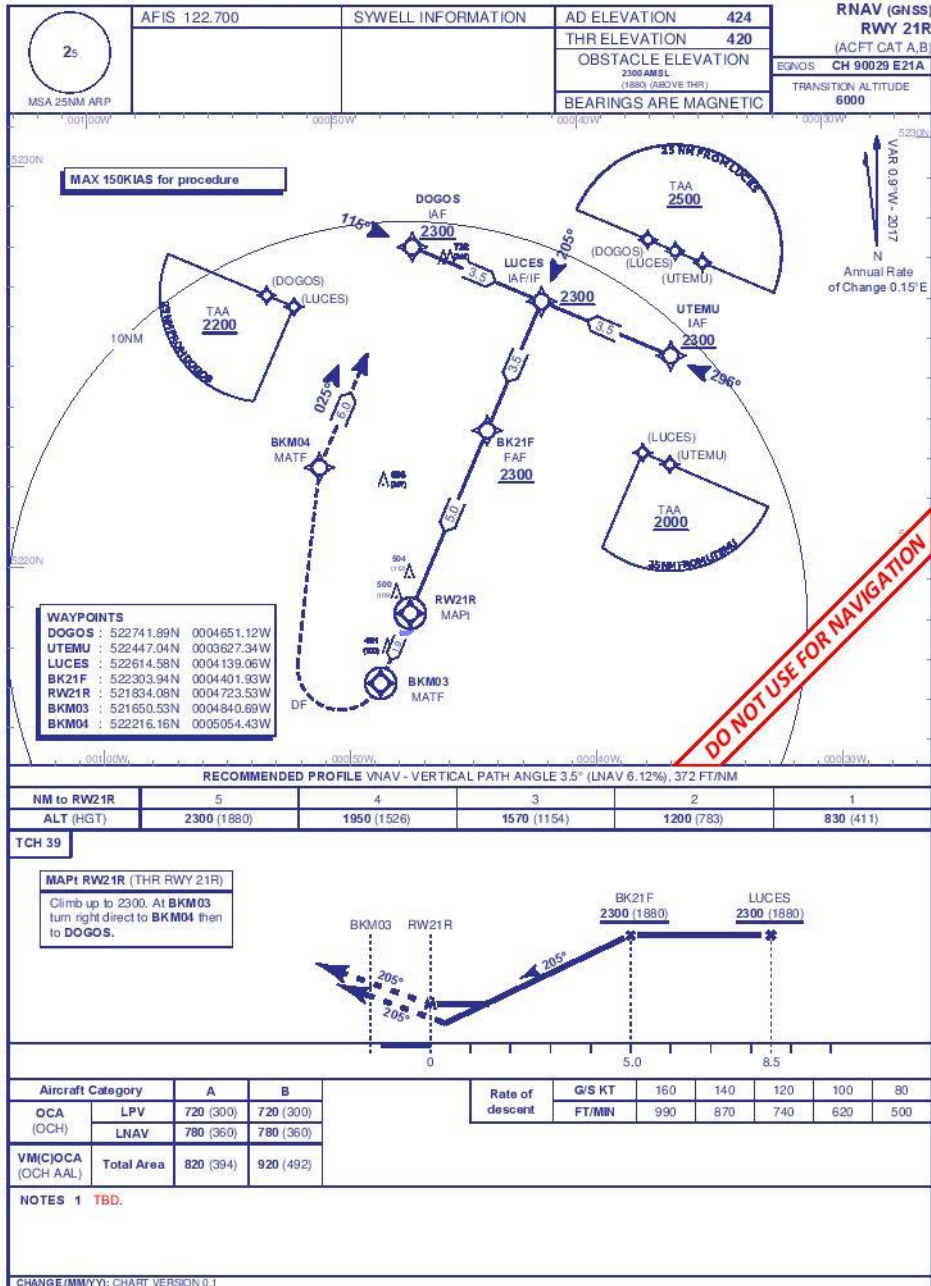
# SYWELL AERODROME IAP – AIRSPACE CHANGE PROPOSAL

UNITED KINGDOM AIP

AD 2-EGBK-x-x  
DD MM YYYY

## INSTRUMENT APPROACH CHART - ICAO

NORTHAMPTON/SYWELL

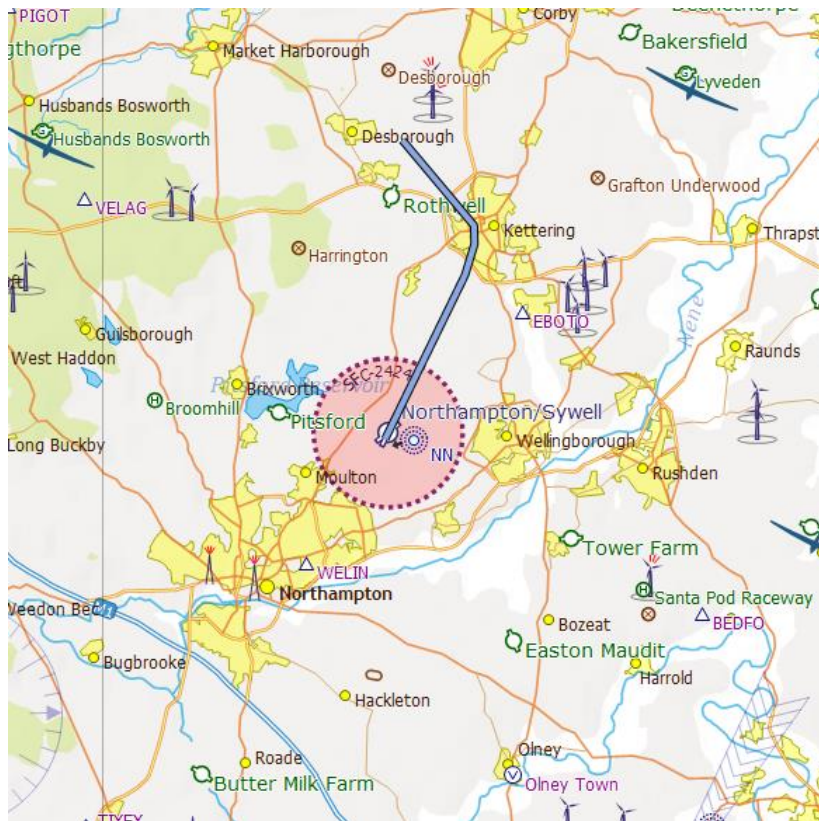


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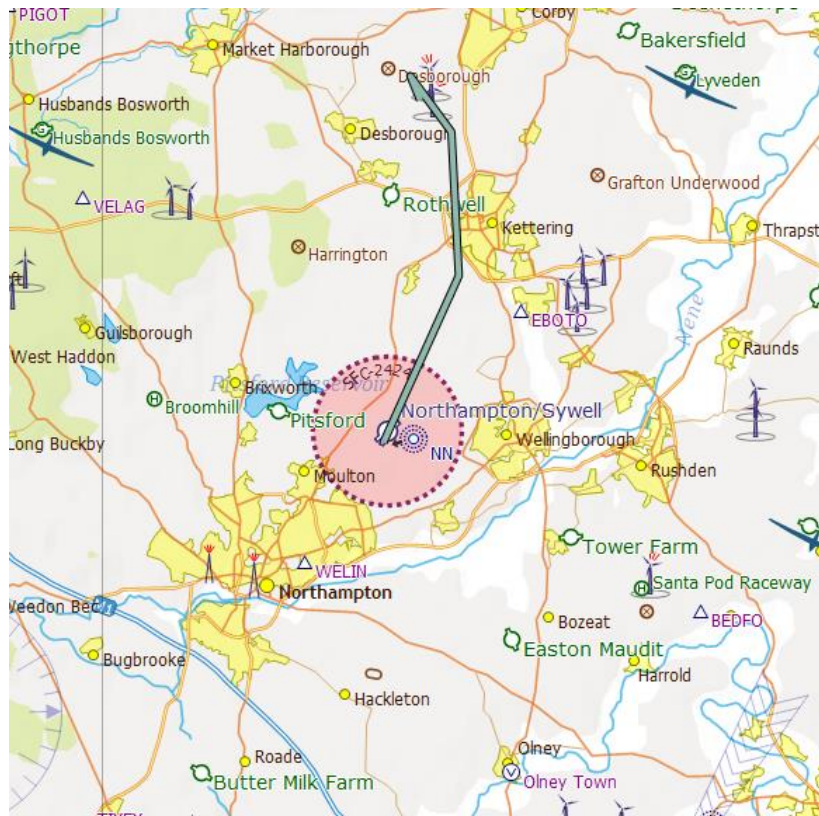
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**Appendix B - Typical VFR Arrivals 21 Right**



PA31 Navajo -VFR arrival track Runway 21R



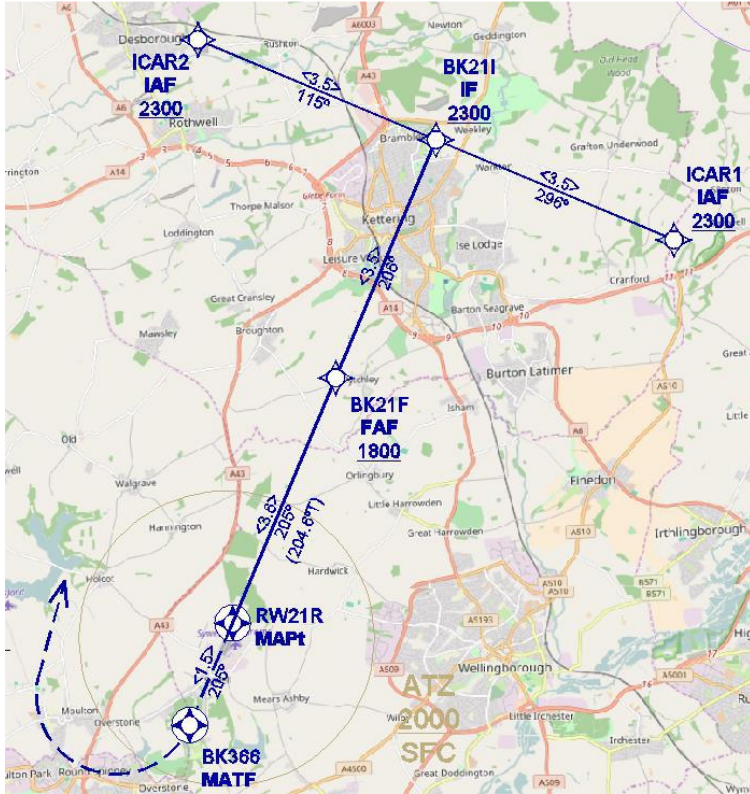
Beech KingAir 200 - VFR arrival after leaving controlled airspace runway 21R



**Appendix C – Development Designs**

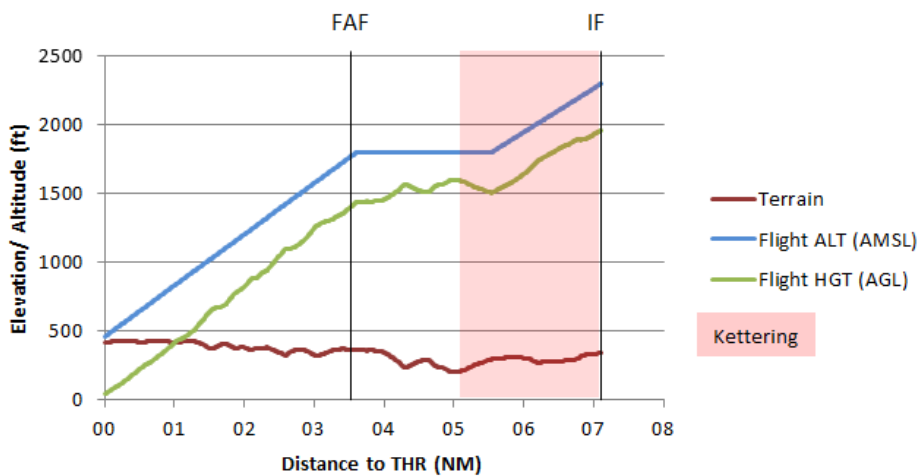
The approach procedures below were considered during the design development process.

**Sywell 21R –Straight-in approach, FAF 1800'**

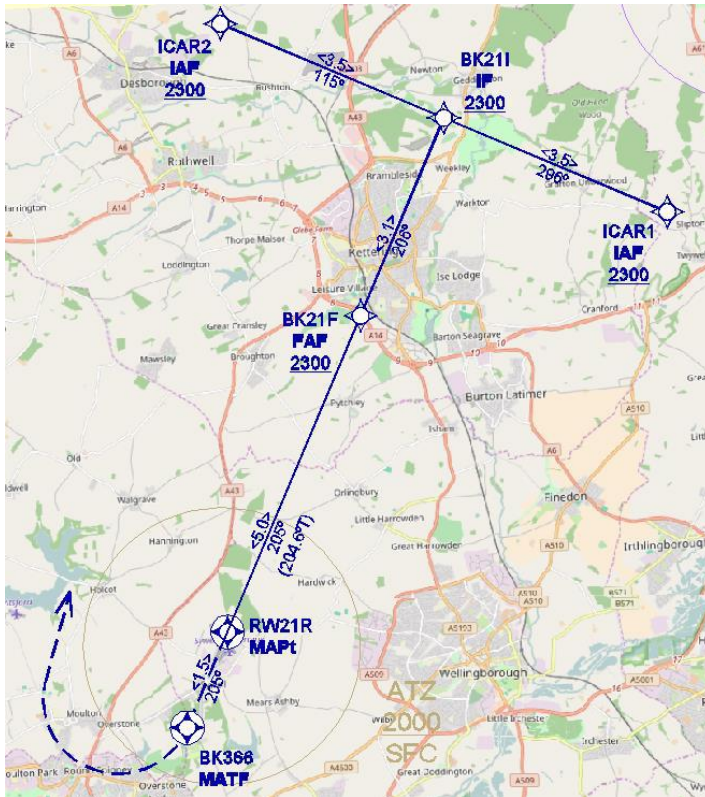


**Key Features:**

- Straight-in approach (no offset)
- GPA 3.5°, TCH 40'
- FAF at 1800'
- Short (1.5NM) straight Missed approach segment for avoiding Northampton

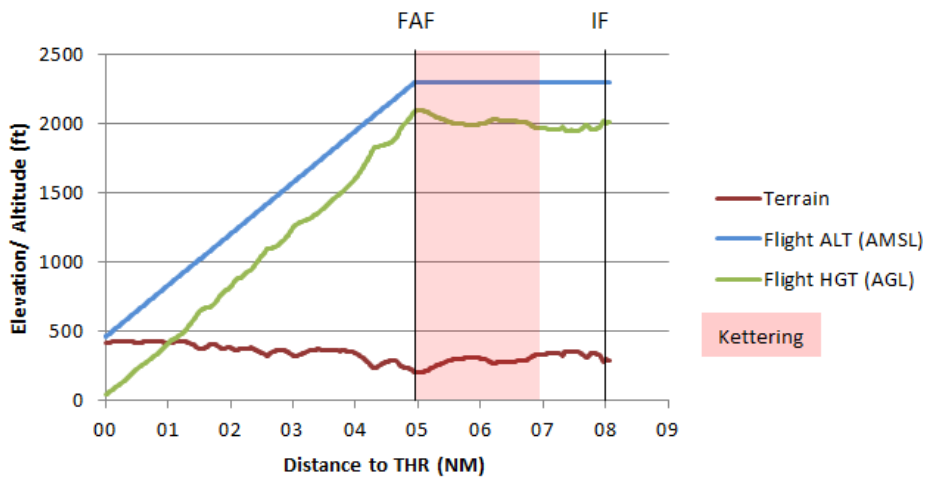


**Sywell 21R – Straight-in approach, FAF 2300'**

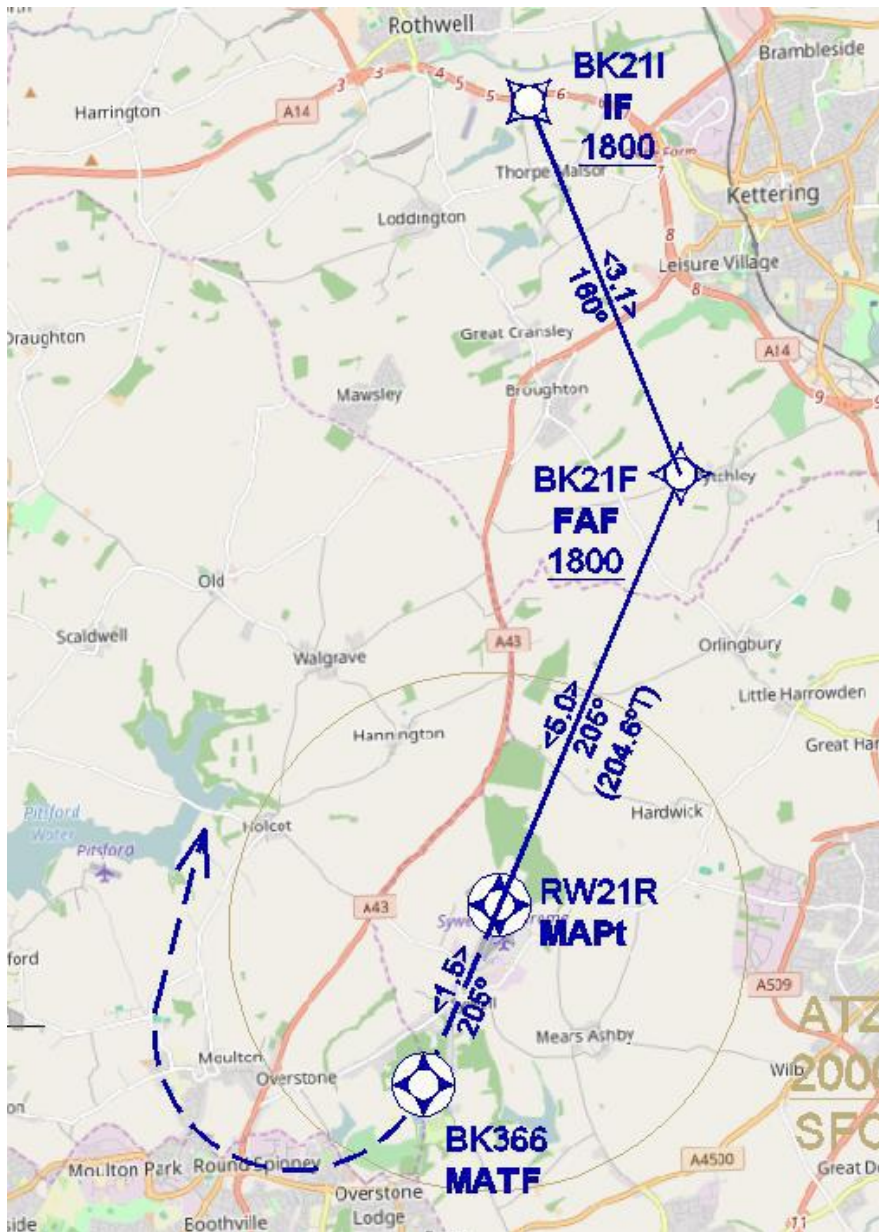


**Key Features:**

- Straight-in approach (no offset)
- GPA 3.5°, TCH 40'
- FAF at 2300' to force CDO as a noise mitigation measure at Kettering
- Short (1.5NM) straight Missed approach segment for avoiding Northampton



## Sywell 21R – LNAV Only approach with turn at FAF

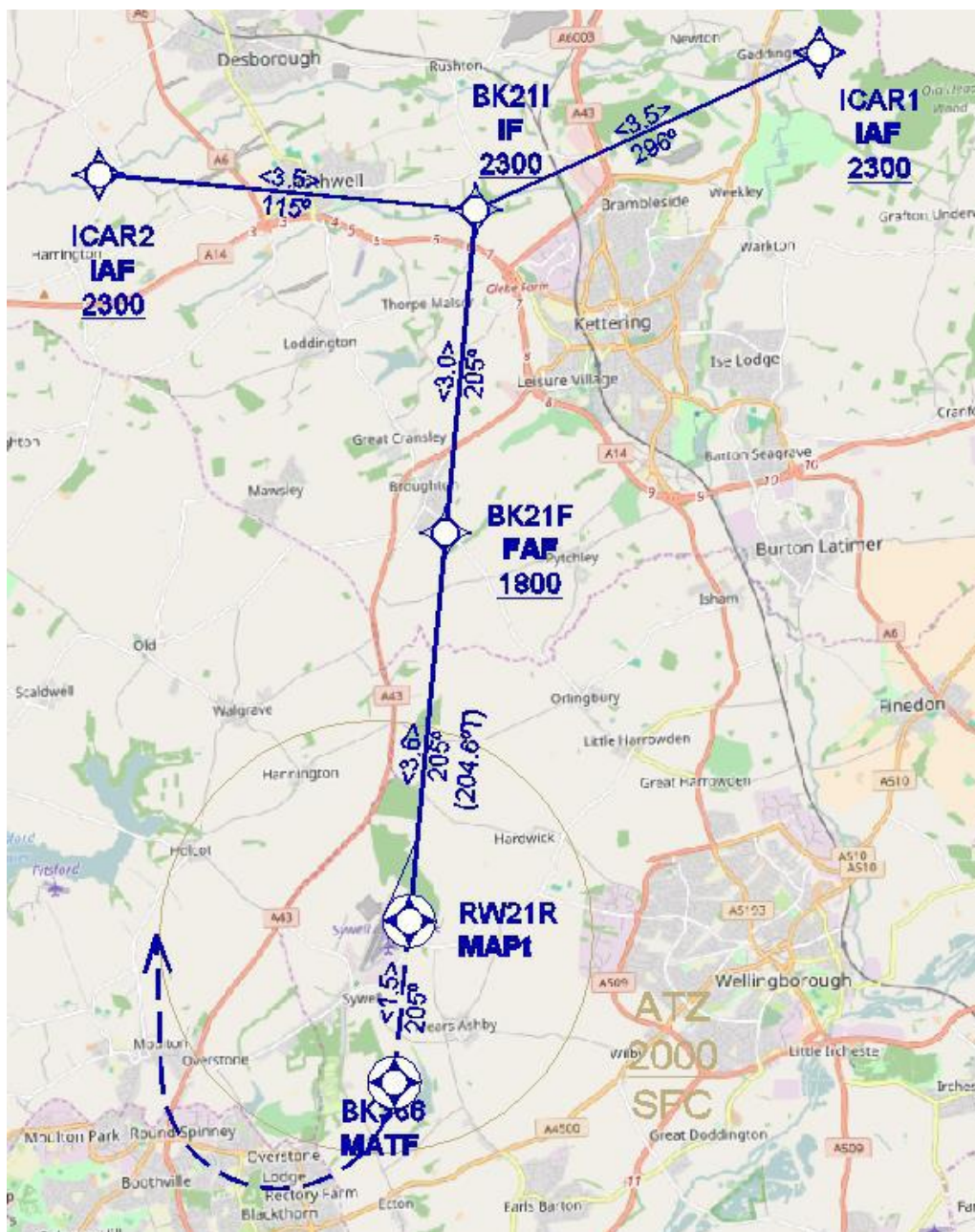


### Key Features:

- Turn at FAF to avoid Kettering
- FAF at 1800'
- Short (1.5NM) straight Missed approach segment for avoiding Northampton

# SYWELL AERODROME IAP – AIRSPACE CHANGE PROPOSAL

## Sywell 21R – LP approach with offset around 18 degrees



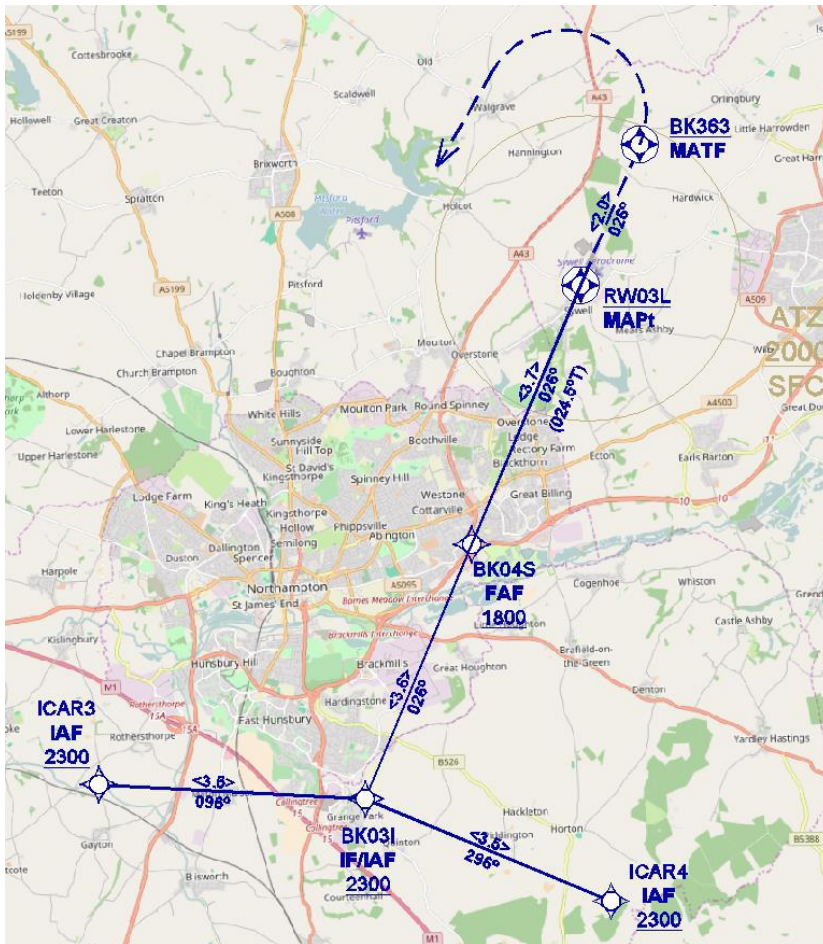
### Key Features:

- Offset approach to avoid Kettering
- FAF at 1800'
- Short (1.5NM) straight Missed approach segment for avoiding Northampton



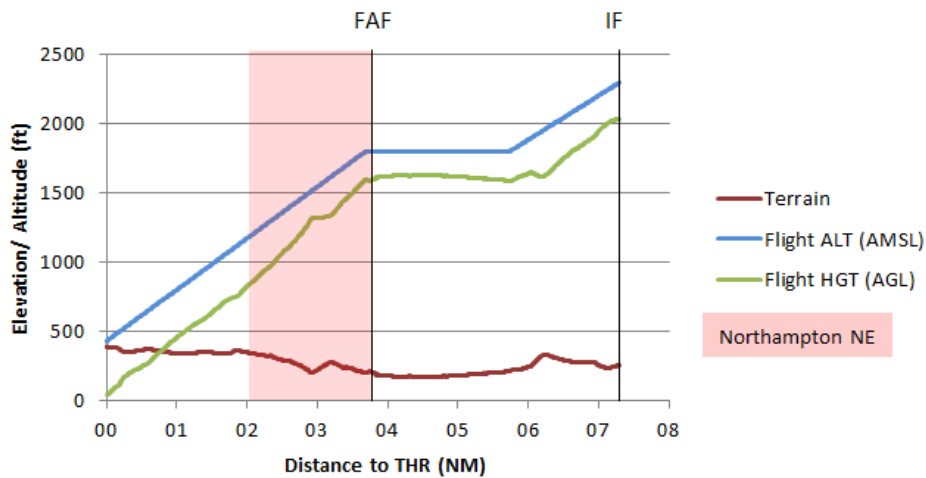
# SYWELL AERODROME IAP – AIRSPACE CHANGE PROPOSAL

## Sywell 03L – Straight-in approach, FAF 1800'



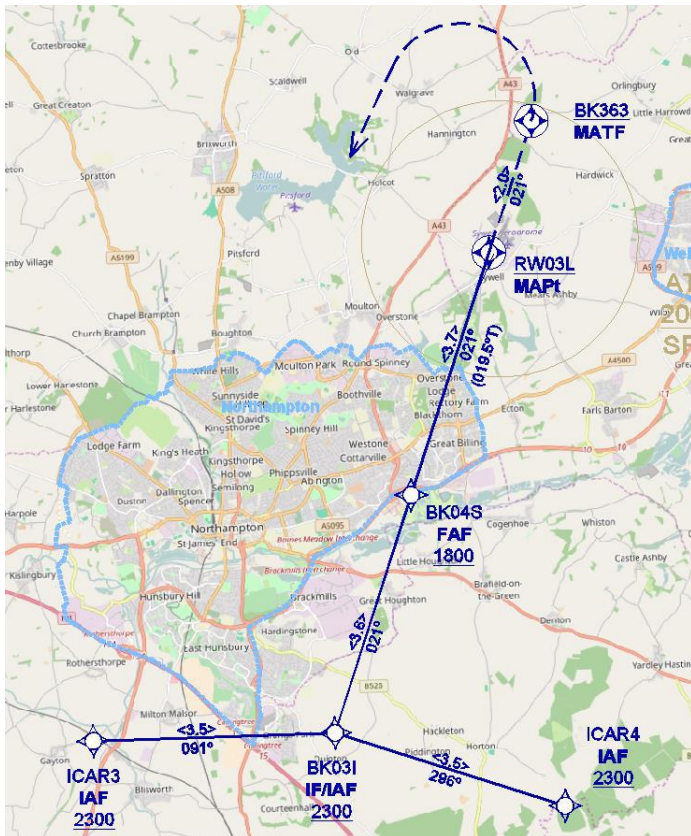
### Key Features:

- Straight-in approach (no offset)
- GPA 3.5°, TCH 40'
- FAF at 1800'
- Short (2.0NM) straight Missed approach segment for avoiding Kettering



# SYWELL AERODROME IAP – AIRSPACE CHANGE PROPOSAL

## Sywell 03L – Offset approach 5 degrees



### Key Features:

- Offset approach to minimise Northampton overflight
- GPA 3.5°, TCH 40'
- FAF at 1800'
- Short (2.0NM) straight Missed approach segment for avoiding Kettering

