**Bicester Heritage** 



Operational implications of the proposed F.A.S.T. (Future Automotive Speed and Technology) zone at Bicester airfield



Consultant's Report

November 2019



# **Contents**

- 1. Introduction
- 2. Background to Bicester Airfield
- 3. Proposed location of the F.A.S.T. (Future Automotive Speed and Technology) zone
- 4. Powered and gliding operations
- 5. Aerodrome licensing
- 6. Possible constraints on airfield operations due to obstacle clearance requirements
  - 6.1 Nature of obstacle clearance surfaces
  - 6.2 Implications for airfield operations

# 1. Introduction

This report provides an assessment of the implications of the proposed F.A.S.T. (Future Automotive Speed and Technology) zone on the flying operations at Bicester airfield in Oxfordshire. Bicester airfield, which was formerly RAF Bicester, has been redeveloped as a heritage centre for vintage aircraft and classic cars, although both powered flight and gliding activities continue at the airfield. The report is prepared for the site owner, Bicester Heritage.

The proposed location of the F.A.S.T. zone is to the south of the airfield, between the perimeter track and Skimmingdish Lane. The zone will contain several linked buildings of varying heights, as illustrated in Figure 3.2 overleaf. The report examines the operational implications of the airfield with this development, particularly in relation to the obstacle clearance surfaces and any constraints on the usable length of the operating directions at Bicester airfield.

The assessment is made on the basis of the current configuration of the airfield site and the surrounding buildings and on the basis of the current nature of aviation activities at the airfield. In preparing this report, we have not had any discussions with the current airfield users, although we understand that some consultation on the proposed development has taken place with the airfield's owner, Bicester Heritage. Whilst we believe that all the principal operational issues are addressed, we would recommend that there is further consultation with the airfield users, particularly with the Bicester Gliding Centre (formerly the Windrushers Gliding Club) who are the main users of the airfield itself.

## 2. Background to Bicester Airfield

Bicester Aerodrome, formerly RAF Bicester, is an airfield on the outskirts of the English town of Bicester in Oxfordshire. Dating back to 1916, this military airfield is notable as the location of the first flight of the prototype Handley Page Halifax in1939 and was later the home of No.71 Maintenance Unit, RAF (Royal Air Force); the RAF finally left in 2004.

The airfield was subsequently purchased by Bicester Heritage and it is now the UK's first business park for the restoration, storage and enjoyment of vintage and classic cars, motorcycles and aeroplanes, as well as an active operational airfield for powered aircraft and gliding.

The airfield consists of 348 acres (139ha) of well-drained short-mown grass, with three nominal 'runways' or operating directions (not marked) of 06/24, 13/31,18/36, each 1,000 m (3,281 ft) long. These take-off and landing runs are normally utilized – although any part of the grassed airfield within the perimeter track can be used. The airfield surface is bumpy in places, due to collapsing field drains, requiring care on the part of pilots operating aircraft in those areas. There are a number of buildings on the western side of the airfield including a brick-built 1934 "Fort" type 1959/34 control tower and two C-type and two A-type aircraft hangars.

The layout of Bicester airfield is shown in Figure 2.1 below. It should be noted that this aerial photograph is taken in an easterly direction.





The airfield buildings, several of which are listed, are occupied by a variety of specialist companies for the preservation and use of vintage motor

cars and aeroplanes. These include *Finest Hour Experiences*, a company which offers introductory flying lessons in acrobatic and vintage aircraft.

The bulk of the airfield's movements are by gliders. Some of these flights are launched by a (powered) tug, although the majority are launched by winch operations parallel to each runway with a separation of between 100-150 feet. Other users include powered flights by vintage and other aircraft either based at or visiting the airfield. Bicester Heritage organizes a number of fly-in or other similar events—so there is a wide range of aircraft types that might potentially wish to use the airfield subject to runway length and weather conditions.

## 3. Proposed location of F.A.S.T. zone

The proposed location of the F.A.S.T. zone in relation to the airfield and the three main operating take-off and landing tracks (Runways 06/24, 13/31 and 18/36) is shown in Figure 3.1. The proposed buildings within the zone and their maximum heights are shown in Figure 3.2.



Figure.3.1 Bicester Airfield – Location of F.A.S.T. zone



Figure 3.2 Bicester Airfield – Proposed F.A.S.T. zone (Building heights)

# 4. Powered and gliding operations

Powered flights (typically by single or twin engine piston aircraft) will normally takeoff and land into the prevailing wind. There are no marked runways, although we understand that pilots will normally one of the runway orientations as shown in Figure 3.1.

As indicated above, there are a small number of powered aircraft based at Bicester including tugs used for glider launches. A number of visiting aircraft also use the airfield, including those attending fly-in or other special events.

The majority of movements at the airfield are by gliders. Bicester Gliding Centre operates a number of club and privately-owned gliders, varying from lower performance training aircraft to more modern ones, utilised for both training and solo hire. Launching is by aerotow winch and lift comes mainly from thermals. The winch uses the latest synthetic rope, which improves launch heights, reduces wear and is less prone to tangling, as well as being safer than traditional steel cable.

Aerodrome procedures have been developed which allow gliding to operate safely alongside other aviation activities. These essentially rely on airspace (circuit options for users enable gliders and other aircraft to fly together whilst minimizing conflict) and ground space – gliders require space for launch, space for the launch queue (often termed a 'grid') and somewhere to land and await retrieval by a ground crew

(something that happens quickly but is obviously slower than a powered aircraft vacating a runway).

The orientation chosen will depend on the wind conditions. At Bicester, as at most UK airfields, the prevailing wind direction is from the southwest. This is illustrated by the wind rose for the Oxford area (including Bicester) in Figure 4.1 below.





Given these conditions, it is clear that the majority (probably around 80 percent) of take-offs and landings, including glider launches by winch, will be in the R06/24 direction into wind (see Figure 3.1).

The length of runway required for take-off and landing is dependent primarily on aircraft type performance, although the wind and the runway surface conditions (eg whether the grass is wet or dry) also has some impact on this.

# 5. Aerodrome licensing

It is a legal requirement for an aerodrome to be licensed by the UK Civil Aviation Authority (CAA) if it is used for:

- Commercial passenger flights
- Public transport passenger flights
- Flying training in aircraft above a specified weight.

If this is the case, the airfield must conform to certain physical, operational and safety requirements which are defined in CAP (Civil Aviation Publication) 168 – 'Licensing of Aerodromes'.

Bicester airfield does not undertake any of the type of flights listed above and is unlicensed. As such, it is expected to conform to guidance provided by the CAA in CAP 793 – 'Safe Operating Practices at Unlicensed Aerodromes'. There are no stated requirements on the heights of obstacles or buildings around an airfield apart from a recommendation that there are no obstacles greater than 150 ft above the average runway elevation within 2,000m of the runway mid-point. In practice, however an obstacle close to or on the runway alignment could potentially impact on the usable length of the runway, subject to the performance of the aircraft involved. In these circumstances, it is ultimately the responsibility of the pilot to ensure that the aircraft can operate safely at the airfield – although the airfield operator is expected to notify pilots of any obstacles or other safety issues in the relevant publications (eg Pooley's Flight Guide, Jepperson etc).

To calculate this potential maximum reduction in the total take-off and landing distance available on this runway, we have applied the obstacle clearance criteria

for a licensed aerodrome as this represents a 'gold standard' in terms of operational safety, even though Bicester is unlicensed. This is assessed in Section 6 below. Operations on the predominantly-used R06/24 and the R13/31 runways are unaffected by these buildings, so the take-off and landing distances on these runways are unaltered.

# 6. Possible constraints on airfield operations due to obstacle clearance requirements

#### 6.1 Nature of obstacle clearance surfaces

As a result of the F.A.S.T. zone buildings there would be a small reduction in the take-off distance available (TODA) and landing distance LDA at the southern end of the R18/36 runway, affecting take-offs to the south and landings to the north. Take-offs to the north and landings to the south are unaffected.

To evaluate the potential maximum reduction in TODA and LDA, we have assessed the impact were Bicester to be considered as a CAA licensed aerodrome. As such, this represents a 'gold standard' in terms of operational safety at UK airfields.

The obstacle clearance requirements for licensed aerodromes are set out in Chapter 4 of CAP 168 and in Annex 14 to the ICAO Chicago Convention. The key limitation surfaces are as follows:

- The Take Off Climb Surface
- The Approach Surface
- The Transitional Surface
- The Inner Horizontal Surface
- The Conical Surface
- The Outer Horizontal Surface

The key surfaces applicable are the take-off climb surface and the approach surface. A breach of Inner Horizontal Surface only applies above a height of 45m above the runway – so given that the F.A.S.T. zone buildings would be a maximum of 11.5 metres high, no breach would occur. Similarly the transitional, conical and outer horizontal surfaces would not be breached in view of the location of these buildings.

The overall length of the R18/36 'runway' is approximately 1,000 metres (or 920 metres excluding a theoretical runway strip). This allows for a 25m buffer area between the runway and the perimeter track<sup>1</sup>. It would be classified by ICAO as a Code 1 runway.

### 6.2 Take-off climb and approach surfaces

A take-off climb surface is an inclined plane located beyond the end of the take-off run available or the end of the clearway where one is provided. The limits of a take-off climb surface comprise: an inner edge of specified length, perpendicular to the extended centreline of the runway, at the end of the clearway, when such is provided, but in no case less than a distance of 60m measured horizontally in the direction of take-off beyond the end of the declared take-off run available, where the code number is 1. The slope of this surface is 1 in 20.

The take-off climb surface for a Code 1 runway is shown diagrammatically below.



If it is assumed that the F.A.S.T. zone buildings are a maximum of 10.5m in height within a 10 degree splay either side of the runway centreline, then the distance required from the runway threshold without breach of the surface is 60m

<sup>&</sup>lt;sup>11</sup> This buffer area is not used for aviation operations but it is available in emergency situations.

+ 10.5m x 20 = 270m. Given, however, that the runway currently commences some 25m from the perimeter track, the operating distance only reduces by about 60-80m. This still leaves a usable runway length of about 920m-940m, which is suitable for aircraft currently operating at the airfield.

These constraints are illustrated in Figure 6.1 below:



Figure 6.1 Bicester Airfield – R36 operating constraints

The CAP 168 operating constraints for approaches on a Category 1 airfield are identical to those for take-offs – so this reduction in the usable runway length applies for both approaches on R36.

#### 6.3 Implications for airfield operations

In summary, the development of the F.A.S.T. zone as proposed would have little impact on current airfield operations at Bicester. In practice, the majority of aircraft movements are by gliders rather than by powered aircraft, with the majority of glider movements launched by winch rather than by aerotow.

Whilst there would theoretically be small reduction of around 60m-80m in the takeoff distance available (TODA) on the R18 runway and a corresponding reduction in the landing distance available (LDA) on the R36 runway if 'gold standard' licensed aerodrome standards were to be applied – the overall length available would be sufficient for the types of powered aircraft currently using the airfield and for glider operations by winch or aerotow in a R18 direction. We acknowledge that there may be some loss of a possible safe landing area (eg following an abortive take-off in a R18 direction), although the overall level of risk from this is minimal, given the level of usage of this runway.

On the basis that Bicester were considered to be a licensed aerodrome (ie a 'worst-case' scenario in terms of loss of TODA/LDA). In practice, given that Bicester is unlicensed, the effective loss of TODA/LDA as a result of F.A.S.T. zone buildings, is dependent on the the building height and the climb gradient of the aircraft flown. The CAA criteria assume a climb gradient of 5% (ie a worst-case scenario for this type of runway). In any event, the buildings will not prevent continued operations at the airfield, having regard to the aircraft currently flown.

On balance, therefore, we see no reason why, from an aviation standpoint, planning consent for this development should not be given.



Elfin House 1A Elfin Grove Teddington Middlesex TW11 8RD

Tel: 020 8977 2300 Email: info@alanstratford.co.uk Web: www.alanstratford.co.uk

