Proposed F.A.S.T. (Future Automotive Speed and Technology) Zone at Bicester Airfield (19/02708/OUT):

Aviation Safeguarding Review and Assessment

EAS/P1218/R1/Issue 1

Report prepared on behalf of Cherwell District Council

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Eddowes Aviation Safety Ltd
Specialist Aviation Assessments

Authorisation Sheet

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Summary

1. Bicester Motion Limited has applied for planning permission for the development of a parcel of land at Bicester Airfield under an outline application to provide new employment units comprising B1 (Business), B2 (General Industrial), and B8 (Storage) uses with ancillary offices, storage, display and sales. The scheme overall is intended to provide a Future Automotive Speed & Technology Hub, known as F.A.S.T. The application was accompanied by a consultant's report that gave some consideration to possible impacts on aircraft operations at the airfield. The authors of the report, Alan Stratford Associates (ASA), concluded that they saw no reason why, from an aviation standpoint, planning consent for this development should not be given.

2. In response, objections to the proposal have been submitted by the Bicester Gliding Centre (BGC) and the General Aviation Awareness Council (GAAC) which provide comment on deficiencies they identify in the ASA Report.

3. Within the context of these conflicting opinions, Cherwell District Council has asked Eddowes Aviation Safety Limited to provide independent advice on the likely impacts of the proposal on operations at Bicester Airfield to assist in the determination of the application. Specifically, the Council has asked for:

    1. An independent report on the impacts of the proposal on aviation, with a specific focus on gliding.
    2. Appraisal of the applicant's aviation report to understand if the approach used is appropriate.

4. The appraisal of the applicant's aviation report in response to this request has shown that the general approach to the assessment of potential impacts on operations at Bicester Airfield that has been employed in the ASA Report is not appropriate. The following key deficiencies in the assessment presented in the report have been identified:

    a. The use of obstacle limitation surface criteria defined to support the licensing of aerodromes is not an appropriate basis for assessing impacts on normal glider airfield operations. A specific assessment of the relevant operations is required.

    b. In any event, the obstacle limitation surface criteria to which reference has been made have not been appropriately applied.

    c. The assumed runway direction for operations in the vicinity of the development site employed in the assessment is incorrect.

    d. The assessment has not considered the full range of options for take-off and landing in any given direction that is available at the grass airfield.

    e. Assumptions concerning the usage of different runway directions are incorrect.

    f. The assessment of impacts associated with the loss of land for possible use to support safe forced landings is superficial and is based on incorrect assumptions concerning the proportion of operations that may be affected.

    g. There are other potential adverse impacts of possible concern that have not been considered in the ASA Report.

    It is concluded that the ASA Report does not provide a sound basis for supporting the determination of the application.

5. The review of the submissions of the BGC and the GAAC has identified no firm technical basis presented in them to demonstrate any material adverse impact on glider operations or any other reasonably foreseeable future aircraft operations at Bicester Airfield. The BGC have indicated that the F.A.S.T centre should have limited impact on the current gliding and powered aircraft operations at Bicester Airfield. They raise broader concerns about the possibility of the development compromising future gliding operations alongside increased levels of operation by powered aircraft. The technical basis for these concerns is not set out in any detail in the submissions from the BGC and would appear to be based on speculation about the possible future development of powered aircraft operations alongside current glider operations which is ill-defined. It is concluded that the BGC and GAAC submissions do not present any aviation-related grounds for refusal of the application.

6. The independent operational safeguarding assessment undertaken as part of this overall review indicates that the proposed F.A.S.T. development appears to be unlikely to have any significant adverse impacts on glider operations or any other reasonably foreseeable future aircraft operations at Bicester Airfield. The assessment has made reference to operational practices at Bicester Airfield identified by the BGC to determine the likely impacts on normal take-off and landing operations and the reasonably foreseeable incident scenarios of engine failure on take-off or other precursors leading to forced landing, undershoot on landing and overrun. Further consideration has also been given to possible building wake turbulence impacts. The validity of those findings will be dependent to some extent upon the interpretation of the publicly available information concerning operations that forms the basis of the assumptions underpinning the assessment. The interpretation of this information and the associated assumptions are considered to be reasonable though it is accepted that some details of the operational practices in use may differ from those assumed. Unless additional information is provided by those responsible for operations at Bicester Airfield showing that the assumptions are not appropriate and that operations are materially different from those assumed, it will be reasonable to conclude that the F.A.S.T development will not have a material adverse impact on the safety and efficiency of aircraft operations at Bicester Airfield.

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1 Introduction

1.1 Bicester Motion Limited has applied for planning permission for the development of a parcel of land at Bicester Airfield under an outline application to provide new employment units comprising B1 (Business), B2 (General Industrial), and B8 (Storage) uses with ancillary offices, storage, display and sales. The scheme overall is intended to provide a Future Automotive Speed & Technology Hub, known as F.A.S.T. The application was accompanied by a consultant's report that gave some consideration to possible impacts on aircraft operations at the airfield. The authors of the report, Alan Stratford Associates (ASA), concluded that they saw no reason why, from an aviation standpoint, planning consent for this development should not be given.

1.2 In response, comments on the application and the ASA report have been submitted by the operators of the Bicester Gliding Centre (BGC), noting that the aviation assessment has been developed without consulting airfield users and asserting that, as a result, the assessment has drawn several erroneous conclusions. The overall position presented by the BGC is essentially that, whilst they believe that some adverse impacts from the proposal on operation of the airfield would be inevitable, it could be acceptable if it allowed alternative aviation approach, take-off and safety margins to be maintained elsewhere. They have stated that they object to the application pending full consideration of and response to their comments.

1.3 A letter of objection to the proposed application has also been received from the General Aviation Awareness Council (GAAC).

1.4 Within the context of these conflicting opinions, Cherwell District Council has asked Eddowes Aviation Safety Limited to provide independent advice on the likely impacts of the proposal on operations at Bicester Airfield to assist in the determination of the application. Specifically, the Council has asked for:

1. An independent report on the impacts of the proposal on aviation, with a specific focus on gliding.
2. Appraisal of the applicant's aviation report to understand if the approach used is appropriate.

1.5 In identifying those requirements, the Council noted that the applicant's planning statement includes a masterplan for the wider site which is an aspirational document with no planning status. The current application relates to a portion of the site and at present the Council require a view on the proposal itself (the area within the redline).

1.6 This report sets out the findings of the required aviation safeguarding review and assessment. In the first instance it considers relevant documents submitted in relation to the proposal, comprising the following:

1. The ASA report, prepared on behalf of the applicant, and the Bicester Motion Aviation Statement.
2. Three submissions from the BGC relating to the application, comprising a request for an extension to the response period, dated 19/12/2019 and comments dated 14/01/2020 and 12/02/2020.
3. Two submissions from the General Aviation Awareness Council relating to the application, dated 27/12/2020 and 14/02/2020.

This review is followed by a comprehensive independent operational safeguarding assessment of the anticipated impacts of the proposal before some conclusions are drawn from the overall review process.

2 ASA Report Review

2.1 The ASA report is relatively brief, comprising ten pages of text. A substantial part of that text is background, relating to the development proposal, the history of the aerodrome and the nature of current operations at the airfield. The technical assessment of the likely impact of the proposal on aviation is relatively limited. Some consideration is given to wind conditions and the associated implications for aircraft operations at Section 4 of the report. The majority of the assessment (four pages of text) is provided at Section 6 entitled "Possible constraints on airfield operations due to obstacle clearance requirements." Consideration is given to these two separate technical elements of the report in turn.

2.2 At Section 4, the report considers the dependence of airfield operations on wind conditions and presents a wind rose at Figure 4.1. The report goes on to state that *"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."*

2.3 It is far from clear from the information provided in the ASA Report that the percentage of operations will be in the direction stated. In the first instance, the pictorial representation in the form of a wind rose does not translate readily from visual inspection into a numerical split. Secondly, the time period for the wind rose example is not stated so it is unclear whether it can be considered to be sufficiently representative of the longer term. Thirdly, whilst wind conditions are generally an important consideration in determining the preferred runway direction, they are not the only consideration.

2.4 This last point is particularly pertinent in the current context, as has been identified by the BGC in one of their responses discussed further below. Whilst there is a general preference for take-off and landing into the wind, this need not always be the dominant consideration. It therefore cannot be assumed that the percentage of Runway 06/24 operations will reflect the presence of a headwind in those directions. Take-off in the Runway 24 direction involves flight over a built-up area which provides limited scope for an emergency landing in the event of problems during the launch, such as engine failure affecting the aerotow aircraft. This constraint generally does not apply for take-off in other runway directions.

2.5 It would therefore be reasonable for the criteria for selection of the preferred take-off direction to be based initially on avoidance of Runway 24 whenever practicable, to optimise safety in the event of problems during take-off. In that case, the weather-related criterion associated with the above primary safety-related criterion would be compliance with an appropriate cross wind limit. In summary, take-off will be in the Runway 24 direction only if the 240° headwind is of sufficient strength for the crosswind component for the other runway options to exceed the appropriate crosswind limit for the operations concerned. If those criteria are applied, the proportion of Runway 24 take-off operations will be lower than if maximising the headwind component were the only criterion for selecting the runway. It is evident from the submission of the BGC that these sorts of wider considerations are applied to runway selection, as discussed in further detail in Section 3. Accordingly, the assumption concerning runway use in the ASA Report is incorrect.

2.6 The assessment of the scale of the impact of the proposed development is based in part on the assumption that take-off operations on Runway 24 are unaffected by

the buildings of the proposed development and that this is the predominantly used runway. Since that assumption is flawed, it follows that the assessment of the scale of the impact is questionable.

2.7 Section 6 of the ASA Report provides an assessment of the anticipated impact of the proposed development on Runway 18/36 operations that involve flight over the development site against obstacle limitation surface criteria which have a role in safeguarding flight paths at licensed aerodromes that serve commercial air transport operations. These obstacle limitation surfaces (OLS) are a set of predominantly planar surfaces arranged about the runways at an airfield and associated flight paths that define the volume of airspace that are preferably to be kept free of obstacles. These criteria are presented in the ASA Report as "a 'gold standard' in terms of operational safety at UK airfields, on the basis that they apply to licensed aerodromes.

2.8 The report makes reference to the specification for the obstacle limitation surfaces in Civil Aviation Publication (CAP) 168 [1] and the standards and recommended practices [2] of the International Civil Aviation Organisation (ICAO) which CAP 168 implements in the UK, in particular the take-off climb surface and approach surface. These surfaces associated with Runway 18/36, if applied at Bicester Airfield, would cross the site and define height constraints for buildings at it. They are funnel shaped sloping surfaces with a defined gradient, as shown in the figure in the ASA Report that is reproduced from CAP 168. The height limit at any distance from the runway end is therefore dependent upon that gradient and the location of the surface origin which is defined with respect to the runway end. The specifications are intended to support aircraft in maintaining a safe vertical margin with respect to obstacles along the take-off and approach paths.

2.9 The details of the OLS specifications applicable at any runway are dependent upon the runway code which is determined according to the length of the runway. The length of the runway at Bicester Airfield is identified in the ASA Report as *"approximately 1,000 metres (or 920 metres excluding a theoretical runway strip)".* On that basis, Runway 18/36 is identified in the ASA Report as Code 1 and a slope for the take-off climb surface and approach surface of 5% is identified, as would apply at a Code 1 runway.

2.10 Referring to CAP 168 and the ICAO standards from which the OLS specifications in it are derived, the Code 1 classification is seen to apply to runways of less than 800 m in length. Runways of 800 m and up to but not including 1,200 m are classified as Code 2 runways. It is evident that Runway 18/36, which the ASA Report identifies to have a length of at least 920 metres, should therefore be classified as a Code 2 runway. In that case, a slope for the take-off climb surface and approach surface of 4% would be applicable. If these OLS criteria were generally applicable to the assessment of the implications of the development for aviation activities at Bicester Airfield, then it is evident that the wrong criteria have been applied in the ASA Report. In practice, as discussed in further detail at paragraphs 2.12 to 0, the OLS criteria are not an appropriate basis for assessing those impacts. It may nevertheless be instructive at this point to follow through the analysis in the ASA Report a little further.

2.11 Making reference to the erroneous value of 5% for the slope of the take-off climb surface, the analysis set out in the ASA Report next identifies the required distance of the runway end from the buildings of the proposed development to avoid an infringement of the surfaces by them. This process provides an estimate for the

reduction in the useable runway length by around 60 to 80 m[1]. The remaining length of runway available is said to be sufficient for the types of powered aircraft currently using the airfield. The overall basis on which that judgement has been made is not presented in the ASA Report since it provides no detail concerning which aircraft types have been considered.

2.12 As has already been mentioned at paragraph 2.10, the OLS are not an adequate basis for assessing the impact of the development. It is inappropriate and misleading for the obstacle clearance criteria for a licensed aerodrome to be presented in the ASA Report as "a 'gold standard' in terms of operational safety that can somehow be relied upon to guarantee little or no impact where developments comply with them. The report essentially recognises that at Section 6.3 when stating that *"the effective loss of [usable runway length] as a result of F.A.S.T. zone buildings, is dependent on the building height and the climb gradient of the aircraft flown."* That is to say, consideration needs to be given to the specific climb performance of the aircraft types operating at Bicester Airfield. No such consideration is provided in the ASA Report.

2.13 As is recognised in the standards, the surface slopes identified in them do not necessarily represent worst-case scenarios. The climb performance characteristics for some aircraft may not meet the specifications in the standards, at least at maximum take-off weights under some conditions. The standards therefore recommend explicitly that *"the operational characteristics of aeroplanes for which the runway is intended should be examined to see if it is desirable to reduce the slope specified in Table 4-2 when critical operating conditions are to be catered to."* That is to say, where operations at a given aerodrome typically involve aircraft for which the climb performance does not meet the standard specification, then it will be necessary to safeguard to a higher specification.

2.14 It is evident from review of the development of the international standards for the slopes of the take-off climb surface by ICAO in the 1950s, 1960s and 1970s that the 5% and 4% slopes identified for Code 1 and Code 2 runways, respectively, are not a reliable basis for demonstrating no operational impact in this instance. The slopes in the standards vary with the length of runway with lower slopes applying at longer runways: e.g. a maximum of 2% at the longest (Code 4) runways with a recommendation identified earlier that a lower slope be adopted where *"critical operating conditions are to be catered for"*. The general adoption of higher slopes at smaller runways than at longer ones reflects the pragmatic balance that was made between maximising the possible operational benefits arising from the OLS specifications and the restrictions these would imply [3]. More importance was attached to maintaining the operational potential at longer runways serving larger aircraft and generally providing more economic activity than at smaller aerodromes. In adopting a 5% slope as a standard to be applied at Code 1 runways serving

[1] There is a further error in the application of the OLS standards in the calculation of the required distance, at least for the Code 1 standard that has been assumed in the ASA Report. The required distance is identified as 60 m + 10.5 x 20 m = 270 m, where the factor of 20 relates to the 5%, i.e. 1 in 20, slope of the surface, 10.5 refers to the building height in metres and 60 m evidently refers to the distance of the surface origin from the end of the runway. If the runway were Code 1, the appropriate specification for the distance of the surface origin from the end of the runway would be 30 m. The value of 60 m would be correct for a Code 2 runway but a factor of 25 would apply for the 4% slope, making the required distance 60 m + 10.5 x 25 m = 322.5 m. On that basis the reduction in useable runway length if this approach were applicable would be 102.5 to 122.5.

international civil operations, it was accepted that this specification may not accommodate all operations and may lead to some restrictions concerning the payloads achievable for some take-off operations if new development up to the limits of the surfaces was allowed.

2.15 In that overall context, it is evident that operation-specific assessment may be required in the case of glider operations, as is specifically recognised in safeguarding guidance [4, 5] issued by the British Gliding Association (BGA) and the GAAC. The relevant guidance states that the standards applicable at licensed aerodromes may not adequately address the needs of unlicensed facilities serving specific types of operations. Having made reference to the standard OLS and associated safeguarding prescriptions, BGA guidance states the following:

"If you operate gliders, helicopters, microlights, hang gliders or other aircraft types then this guidance may have to be considerably adapted to suit your more specialised safeguarding needs."

GAAC guidance makes a similar observation, as follows:

It is recommended that the international standards laid down in CAP 168 are used, unless, of course, your operations require greater protection. For example, glider or microlight operations may require shallower take-offs and/or approaches than standard."

2.16 In summary, the use of the OLS specifications for licensed aerodromes set out in international standards and CAP 168 as a means for assessing the potential impact of new development near an airfield used for glider operations is inappropriate. Proper consideration is required of the safeguarding requirements of the specific types of operations involved which are not necessarily adequately protected by the standard specifications. This matter has been explored in detail previously in the context of a planning decision in respect of development near a glider airfield, confirming the inadequacy of the OLS criteria as the basis for determining the possible impact of new development on operations [6, 7].

2.17 The analysis in the ASA Report is based on an assumed Runway 18/36 direction. Runway designation is based on the magnetic bearing of the runway, rounded to the nearest 5° such that the Runway 18 direction is 180 ± 5° and the Runway 36 direction is 360 ± 5°. As the BGC point out, the direction of the broadly north-south runway in use at Bicester Airfield is 17/35 and not 18/36. The runway direction assumed in the operational analysis is therefore incorrect. This issue is spelt out in further detail in Section 4 at paragraphs 4.1 to 4.3.

2.18 The analysis in the ASA Report is based on specific single axes for the identified runway directions. Whilst this may be appropriate for the assessment of operations at paved runways, it is not appropriate at grass airfields. In practice, operations at grass airfields may take place at a wide range of locations and are not confined to specific fixed runway locations. The basis for operations at Bicester Airfield in this respect is identified in material available on the BGC website and is described further in Section 4 at paragraph 4.4. Not only has an incorrect runway orientation been employed in the ASA Report but the range of different options for use of the relevant orientations has not been considered.

2.19 It is acknowledged in the ASA Report that *"there may be some loss of a possible safe landing area (e.g. following an abortive take-off in a R18 direction)".* It is stated that *"the overall level of risk from this is minimal, given the level of usage of this runway."* As set out earlier at paragraphs 2.2 to 2.5, the basis upon which the

levels of use of the different runways has been estimated is flawed. It follows this judgement cannot be relied upon. In any event, even if the usage of the runway had been properly assessed, this statement is an inadequate basis for evaluating this impact. It is simply a statement with no supporting argument, other than that associated with usage. Loss of a possible safe forced landing area is a potentially serious matter that may lead to fatality or serious injury in circumstances that might otherwise have been managed safely. It was the sole reason for refusal of a recent planning application which was upheld at appeal [7]. Further justification is required concerning the basis on which the conclusion in the ASA Report that the additional risk associated with the loss of this area can be judged acceptable has been reached. Whatever, the scale of the harm, it needs to be described appropriately so that it can be assessed transparently in the planning balance.

2.20 Overall, two potential adverse impacts of the proposed development on operations at Bicester Airfield have been considered in the ASA Report: the impact on normal operations due to the possible intrusion of buildings into flight paths and the possible loss of land that may support safe forced landing during take-off. Based on previous experience of the assessment of the proposals for new development at the perimeter of glider airfields these two impacts may generally be considered to be the primary concerns of the airfield users but are not necessarily the only relevant considerations.

2.21 The Bicester Motion Aviation Statement contains material that is generally consistent with the ASA Report and appears to be intended to be a summary of the context of the proposal and the ASA Report findings. It contains no new material not covered in the ASA Report and therefore requires no further comment here.

2.22 In conclusion, the appraisal of the applicant's aviation report undertaken as part of this safeguarding review has shown that the approach used is not appropriate. The key deficiencies in the approach may be summarised as follows:

1) The use of obstacle limitation surface criteria defined to support the licensing of aerodromes is not an appropriate basis for assessing impacts on normal glider airfield operations. A specific assessment of the relevant operations is required.
2) In any event, the obstacle limitation surface criteria have not been appropriately applied.
3) The assumed runway direction for operations over the development site employed in the assessment is incorrect.
4) The assessment has not considered the full range of options for take-off and landing in any given direction that is available at the grass airfield.
5) Assumptions concerning the usage of different runway directions are incorrect.
6) The assessment of impacts associated with the loss of land for possible use to support safe forced landings is superficial and is based on incorrect assumptions concerning the proportion of operations that may be affected.
7) There are other potential adverse impacts of possible concern that have not been considered in the ASA Report.

3 Review of Bicester Gliding Centre and GAAC Submissions

3.1 As noted in the introduction, the BGC has made three submissions relating to the application, comprising a request for an extension to the response period dated 19/12/2019 and comments dated 14/01/2020 and 12/02/2020. The GAAC has made two submissions, dated 27/12/2020 and 14/02/2020. These five submissions are considered in turn.

BGC request for extension to response period dated 19/12/2019

3.2 This first submission requests an extension to the consultation response period in order to allow sufficient time to review the large volume of documents involved and to allow time for the BGC to meet for discussion with the applicant, Bicester Motion. BGC provide the following context for their proposed meeting and discussions with the applicant:

"Bicester Motion, our landlords, have recently publicly announced their intention significantly to develop aviation at Bicester Airfield whilst retaining gliding as part of the mix. Our initial feeling is that whilst the F.A.S.T centre in isolation should have limited impact on the current gliding and power activity, it could seriously compromise the potential to operate gliding alongside a busy power operation. The safe approach/departure lanes to runway 18/36 and 06/24 would be narrowed to a point that simultaneous operation would be very difficult."

3.3 This submission therefore usefully sets out the general context of the concerns of the BGC which evidently relate primarily to other developments that are distinct from the F.A.S.T. centre proposal but in their view are linked to it in respect of the potential for compromising future safe glider operation at Bicester Airfield. It provides very limited technical comment to support those concerns other than that these relate to the possible narrowing of flight paths that would compromise simultaneous operations, apparently with powered aircraft.

BGC comments dated 14/01/2020

3.4 In the introductory paragraph to these comments, the BGC notes that they were, at the time of writing, still to see the ASA Report and had seen only its broad conclusions that the proposed development will not impact aviation use and will not preclude the use of the airfield for flying, as set out in paragraph 7.112 of the planning statement submitted with the application. In the absence of any insight gained from reading the ASA Report itself, the BGC make the general claim as follows:

"It is our belief that any building on the edge of any airfield must have some aviation impact on the airfield and so needs to be properly assessed. However, in the case of F.A.S.T., we believe that the impact on both the current and stated future aviation activity at Bicester could be acceptable if it allowed alternative aviation approach, take-off and safety margins to be maintained elsewhere."

3.5 Whether or not a material adverse impact would arise from any individual proposal for development on the edge of an airfield will be dependent on the details of the proposal and of the nature of the aviation activities concerned. It is not the case that any development on the edge of an airfield must have some material adverse impact on aviation. Rather than using the wording of the first sentence from the BGC quoted

above, it would perhaps be better to say that any building on the edge of any airfield should be considered to have the potential to have some aviation impact on the airfield unless it has been shown otherwise through a proper assessment.

3.6 The second sentence from the submission quoted above evidently relates to the concern outlined earlier in the request for an extension to the consultation response period relating to maintaining safe operations in future. The submission provides insufficient technical detail regarding these concerns of the BGC to allow any informed comment.

3.7 The submission includes comment concerning the building heights as follows:

"The buildings in the outline application are higher than would seem to be necessary for their stated purpose and thus create an unnecessary hazard to aviation which could be minimised by reducing their height, but given that this may change when a reserved application is submitted, this matter can be addressed at that time or in the period leading up to that application."

3.8 Given the location of the development beneath potential flight paths it would seem appropriate that the minimum building heights that is compatible with their intended use should be adopted in the scheme design, bearing in mind other relevant planning considerations where appropriate. Such matters of detail concerning the appropriate minimum building heights is outside the scope of this assessment. Some consideration of the likely scale of the impact of the building heights as identified in the outline planning permission is given in Section 4.

BGC comments dated 12/02/2020

3.9 This submission opens with a statement that the ASA Report has been developed without consulting airfield users and that, as a result, the assessment has drawn several erroneous conclusions. It then sets out a series of comments numbered 1 to 5 which are reviewed in turn below.

3.10 Comment 1 relates to slight differences in the precise wording used in the planning statement and the ASA Report and requires no further comment in the context of this review. Comment 2 relates to the description of operational details that has no specific bearing on this assessment and similarly requires no further comment here.

3.11 Comment 3 relates to wind direction and the selection of the preferred runway which has already been considered to some extent in Section 2. In accordance with those earlier considerations, this comment states the following:

"In fact, wind direction is only one factor. Risk management of launching at Bicester, which is partly surrounded by development, results in careful selection of take-off directions and climb out routes to avoid in so far as possible the overflight of buildings. … An analysis of the 871 flight logs available for 2018 and 2019 shows just 17% of aero-tows from run 24, with that run used on 18% of days that aero-tow records are available. The new technical site development by Bicester Motion will make the run 24 departure route even less attractive, so this proportion is likely to reduce in future."

3.12 Comment 4 relates to the Runway 18/36 versus Runway 17/35 issue which has already been raised in the context of review of the ASA Report at paragraph 2.17. Further clarification of what are understood to be the take-off directions employed is provided in Section 4 in support of the operational safety assessment.

3.13 Comment 5 relates to the requirements for fencing in respect of a public access route along the line of a former railway line that is envisaged under the proposals, its proximity to the flying field and the need to consider its impact on aviation.

General Aviation Awareness Council submissions, dated 27/12/2020 and 14/02/2020

3.14 The first of these two submissions is a request by email for an extension to the consultation response and contains no technical or other information of relevance to this review and assessment. In the second submission, dated 14/02/2020, the GAAC set out their objection to the application in terms of five different primary factors which are reviewed in turn below.

3.15 The first point appears not to be linked to the application and its impact on aviation operations at Bicester Airfield but to matters relating to future arrangements for the use of the airfield by the BGC and their relationship with the applicant, as owner of the airfield. On the basis that this matter is not of relevance to the determination of the application, it has not been considered further here.

3.16 The second point relates to the issue of runway usage that has already been discussed under the review of BGC's submissions at paragraph 3.12. No further comment on this point is required here.

3.17 Under the third point, the GAAC identify a discrepancy between the building heights as identified in the ASA Report and elsewhere in the Bicester Motion Aviation Statement. The ASA Report identifies a maximum building height of 11.5 m above local ground level at Section 6, which is the same as the maximum height identified in the Bicester Motion Aviation Statement. Both documents refer to the same plans which identify heights AOD. Under the obstacle clearance considerations in the ASA Report at Section 6, the identified calculation which of OLS heights makes reference to a value of 10.5 which apparently refers to the building height in metres relative to the height of the surface origin. It is evident from a review of elevation information provided by Google Earth that there is some variation in local ground level across the area of interest. Though it is not explicitly stated in the ASA Report, it may be that the value of 10.5 m is used in the calculation, rather than the building height with respect to local ground level, to take account of this variation. Since building heights are relevant to the safeguarding assessment, this matter is considered further in Section 4 of this review which provides a specification upon which the operational safeguarding assessment in Section 5 is based.

3.18 Point 4 relates to ecology and is not relevant to the current assessment.

3.19 Point 5 relates to matters of detail concerning drainage at the airfield and is not relevant to the current assessment.

Summary

3.20 The BGC and GAAC submissions make specific technical comments relating to the operational assumptions in the ASA Report as follows:

- Incorrect assumptions concerning runway selection and the usage of different runway directions.
- Incorrect assumption concerning the orientation of the north-south runway.
- Discrepancies concerning the assumed building heights.

3.21 Those three issues are ones that evidently need to be addressed to ensure that the impacts of the proposal have been properly assessed. They are considered further in the operational safety assessment in Section 4 to ensure that appropriate assumptions are made in those respects.

3.22 The BGC indicate an initial view in their first submission that the F.A.S.T centre should have limited impact on the current gliding and powered aircraft operations at Bicester Airfield. They raise broader concerns about the possibility of the development compromising future gliding operations alongside increased levels of operation by powered aircraft. The technical basis for these concerns is not set out in any detail in the submission from the BGC and would appear to be based on speculation about the possible future development of powered aircraft operations alongside current glider operations which is ill-defined.

4 Development Site and Airfield Operations

Development Site and Airfield Description

4.1 As described in the ASA Report, there are three nominal grass runways at Bicester Airfield which are not marked, historically designated 06/24, 13/31 and 18/36, and each approximately 1,000 m in length. Runway designation is based on the magnetic bearing of the runway, rounded to the nearest 5° such that a runway with a designation of 06/24 will have a magnetic bearing of between 55° and 65° in the north-east direction and 235° to 245° in the south-westerly direction. Since magnetic and true north vary with time, runway designations may sometimes need to change. What was until recently Runway 06/24 at Manchester Airport, for example, is now Runway 05/23 whereas what was Runway 10/28 at London City Airport has now become Runway 09/27.

4.2 As has been noted earlier in Section 3, the BGC has pointed out that the ASA Report has mis-placed the southern end of the north-south runway, historically designated Runway 18/36 but now oriented in a Runway 17/35 direction, as defined with respect to magnetic north. At present, magnetic and true north directions in the UK are quite similar and it is perhaps more convenient for the purposes of this assessment to identify the runway directions with respect to true north, identified by reference to markings on the ground evident on the available satellite images. On that basis, the runway orientations shown in Figure 4.1 have been identified by reference to Google Earth satellite images. These orientations are approximately as follows:

- Runway 17/35 - 169°/349°
- Runway 06/24 - 57°/237°
- Runway 13/31 - 116°/296°

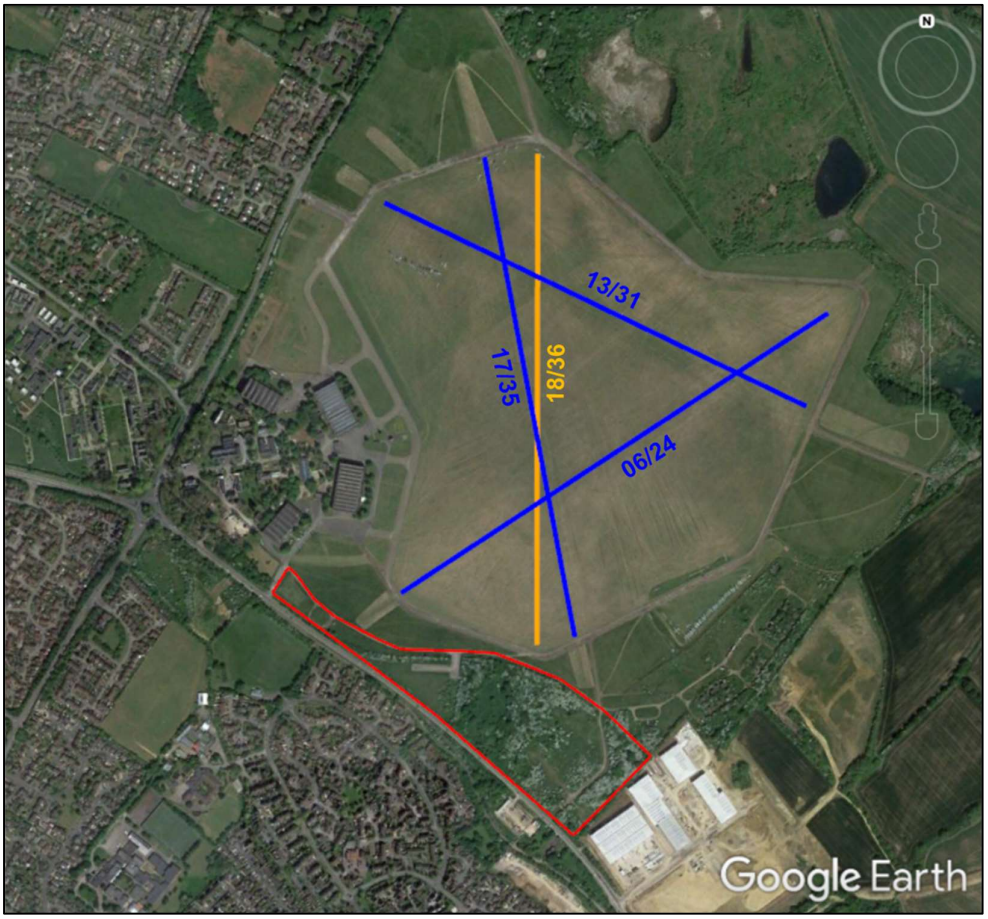
4.3 Based on Figure 3.1 in the ASA Report and making reference to the perimeter road as the primary guide, it is evident that the north-south runway was assumed in the ASA analysis to have an incorrect orientation of essentially 180/360 versus true north, as is also illustrated in Figure 4.1. Whilst the orientations identified above are approximate only, they will be more reliable than those employed in the ASA analysis and will provide an adequate basis for this assessment.

4.4 In practice, it is evident from the information provided on the BGC website that these runways are not the only areas used for take-off and landing. It is common for operations at grass airfields such as Bicester Airfield to make use of the airfield more widely, in particular for glider landing operations. The website states that the runs visible on the satellite image provided are not runways but are no-go cable run areas. It states further that landings are made anywhere in the areas either side. Powered aircraft are identified as utilising areas well to the side of the “no-go cable runs”. Diagrams accessed from the website depicting these operational practices are reproduced at Appendix 1. It is understood from these diagrams that the identified runs are employed for winch launching and that aerotow launches and landings use the areas depicted by the yellow arrows to either side of the winch launch line. It is not clear from the information provided on the BGC website to what extent both take-off and landing use areas either side of the winch launch line.

4.5 The red line boundary of the development site is also shown in Figure 4.1. It is evident from review of this figure that the extrapolated line of the Runway 17 take-off

direction, based on the estimated orientation of 169° versus true north, crosses the eastern corner of the site.

Figure 4.1: Bicester Airfield Runway Layout in relation to Site Boundary



4.6 The location and heights of buildings within the development are shown in Figure 4.2 which is reproduced from the Planning Statement. Referring also to the indicative layout plan submitted with the application and overlaying that on the Google Earth satellite image, the approximate location of the buildings with respect to the airfield and nominal runways can be determined, as shown in Figure 4.3.

Figure 4.2: Proposed Building Locations and Heights

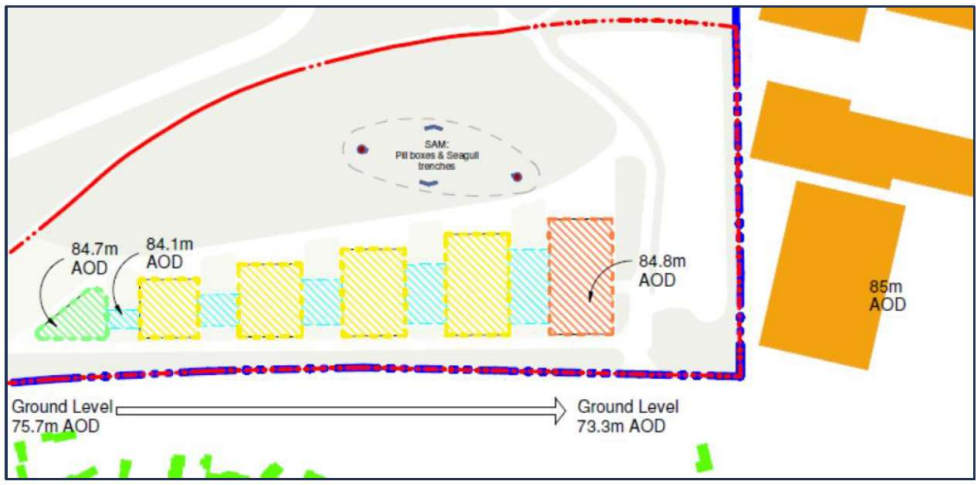
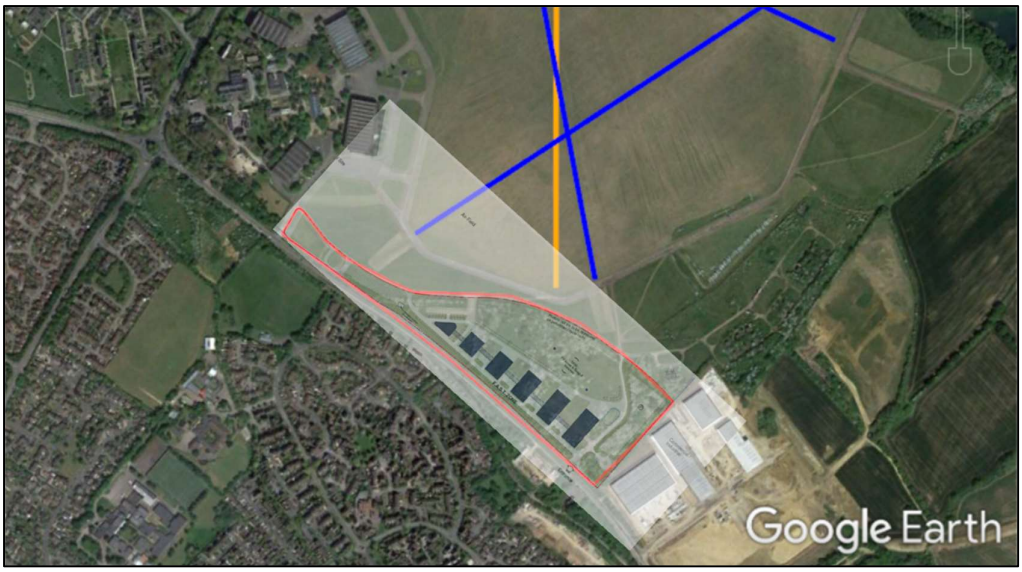


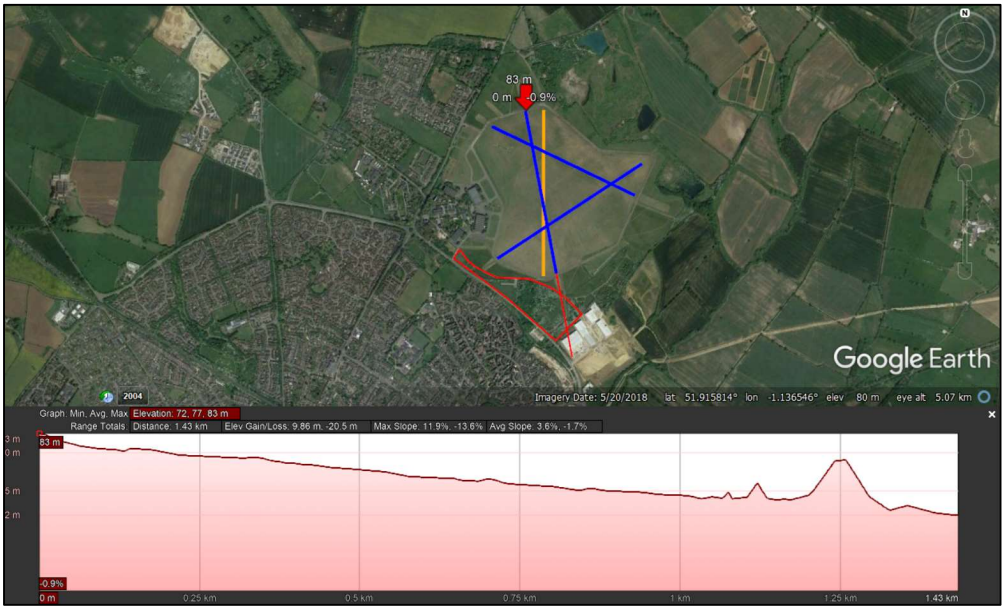
Figure 4.3: Proposed Building Locations in relation to Runway Layout



4.7 Whilst the building locations relative to the runway layout shown in Figure 4.3 are approximate, in the absence of better specifications for their coordinates this representation should be sufficient for the purposes of the current assessment.

4.8 From the perspective of the assessment of potential impacts on obstacle clearance, in particular on take-off, the relative elevations of the runway and the development is a key consideration. Relative ground elevations have been assessed by reference to the profile for the runway and extended centreline available from Google Earth, as shown in Figure 4.4. This profile shows a gradual drop in height along the length of the runway from around 83 m AOD at the northern end of the runway to 75 m at the southern end. This slope continues to the area where the extended centreline crosses the eastern end of the site. The prominent hump evident in the figure is located towards the south-east boundary of the site.

Figure 4.4: Runway and Extended Centreline Elevation Profile



4.9 It appears from the Google Earth satellite images that the site is currently predominantly hawthorn scrub, evident from the white blossom on 20 May when the image was taken. Prior to 2018, land to the immediate south-east of the site that also lies along the runway extended centreline was farmland with hedgerows. As shown in Figures 4.1 and 4.2, this land now accommodates industrial units at a height identified as 85 m AOD.

Airfield Operations

4.10 It is understood that the majority of aircraft operations at Bicester Airfield involve gliders. The BGC website identifies the following gliders in the fleet operating there:

- 4 ASK 13s
- 2 Twin III Acro
- 1 ASK 21
- 3 ASKa 8s
- 2 Grob Astirs
- 1 Falke 2000 motor glider

The BGC identifies 7,595 winch launched and 1,214 aerotow launched glider flights in 2019 which they indicate was a typical year of operations. The aerotow tug aircraft in use have not been identified.

4.11 The ASA Report notes that other users include powered flights by vintage and other aircraft either based at or visiting the airfield. No details of the aircraft types involved have been available to support the assessment. In the absence of further information, these aircraft have been assumed to be generally similar to those employed for general aviation pleasure flying at similar airfields but it is noted that these aircraft types may not be representative of some vintage aircraft.

4.12 In accordance with the review in Sections 2 and 3, runway usage is a relevant consideration when assessing the potential impact of the development on operations.

The BGC identify that 17% of aero-tows were from Runway 24 which was used on 18% of days that aero-tow records are available. They identify further that Runways 17 and 35 are the most used for aero-tow launching with 52% of launches and 48% of days. However, they do not indicate any breakdown into the proportion of southerly (Runway 17) and northerly (Runway 35) operations.

4.13 No information concerning the proportion of landing operations employing any given direction has been identified to support this assessment. In the absence of any information it has been assumed that the preferred approach and landing direction is selected primarily on the basis of wind direction with a further preference for approach over open fields where possible.

5 Operational Safeguarding Assessment

5.1 This safeguarding assessment has sought to determine the extent to which the proposed development may adversely impact on operations at Bicester Airfield by consideration of normal take-off and landing operations and a set of reasonably foreseeable non-standard operations and fault conditions. The following three reasonably foreseeable non-standard operations and fault conditions have been considered:

- Engine failure after take-off (EFATO) and other problems during take-off.
- Undershoot on landing.
- Overrun during either take-off or landing.

These three scenarios are identified on the basis of the historical incident and accident record as being the most common reasonably foreseeable incidents that may need to be accommodated in the environment around an airfield. A wide variety of other incident and accident scenarios can be identified but it may not be practicable to seek to accommodate all of them. The focus in this assessment has therefore been on these three more common scenarios, together with normal operations. In practice, impacts associated with overrun scenarios are not expected to be significant but this scenario has been considered for completeness. Finally, turbulence caused by new development is identified as a potential impact that may merit some consideration.

5.2 To identify relevant operations that might potentially be adversely impacted by the proposed development, reference has been made to the diagrams provided by the BGC depicting take-off and landing areas, reproduced at Appendix 1, to identify flight paths directly above the site. The following operations that require assessment have been identified:

- Take-off in the 17 direction.
- Take-off in the 24 direction.
- Landing in the 06 direction
- Landing in the 35 direction.

Normal Take-off Operations

5.3 To maintain operational efficiency it is necessary to ensure that aircraft that Bicester Airfield wishes to serve can clear all obstacles directly along the take-off path by an appropriate vertical margin, having regard to the length of take-off runway available. The length of runway available will determine whether aircraft will be able to take-off and achieve an appropriate safe height at the airfield boundary. To maximise operational efficiency, it will be preferable to limit the heights of obstacles beyond the airfield boundary such that aircraft that can meet that condition can also clear obstacles along the subsequent flight path by a safe margin. Where there are existing obstacles, these may already place some constraints on operations. The potential impact of a new obstacle can be assessed by reference to the existing obstacle environment. Where it can be shown that the new obstacle is no more restrictive on operations than the existing obstacle environment, it may be concluded that the new obstacle will not introduce any additional operational constraints.

5.4 Considering first Runway 17 take-off operations, it is evident from Figures 4.1, 4.2 and 4.3 that the existing recently constructed commercial units, located immediately to the

east of the site at a height of 85 m AOD, are the first substantial obstacles currently encountered along the flight path. It is evident from Figure 4.3 that these existing obstacles are located along the Runway 17 take-off flight path at a fairly similar distance from the operational end of the runway as the buildings of the development. These buildings have a proposed maximum height of 84.8 m, as shown in Figure 4.2. Whilst there is insufficient detailed information concerning the precise coordinates of these different buildings to undertake a geometrical analysis that would demonstrate unequivocally that there would be absolutely no impact whatsoever, it may nevertheless be concluded that any impact on Runway 17 take-off operations will be limited. This conclusion may confidently be made on the basis of an assessment of the firm reference point provided by the existing obstacle environment.

5.5 Aerotow glider take-off operations to the east of the 35 winch run will be laterally displaced to the extent that these will not involve flight directly over the buildings of the proposed development. Those to the west of the 35 winch run may involve flight directly over the buildings the more northerly of which would be reached slightly earlier along the take-off path than the existing buildings when aircraft are potentially lower during take-off. Further consideration has therefore been given to the potential impact of the buildings of the proposed development on these operations.

5.6 The potential impacts for flight directions directly over the proposed buildings at the site can be assessed by consideration of the take-off distance requirements and climb performance of the types of light aircraft normally employed for aerotow operations and the runway length available at Bicester Airfield. The runway lengths are identified as around 1,000 m, although when allowance is made for the glider and tow rope behind the tug aircraft, the effective take-off distance available for the tug aircraft will be shortened by perhaps a little less than 100 m. This effective runway length compares with the take-off distance requirements of recommended aerotow aircraft of around 300 m to 400 m. That take-off distance refers to the distance required for an aircraft to reach 50 ft (15 m) which is the standard clearance identified in aircraft performance tables. Values given in performance tables will typically relate to operations on a paved surface. Operations on grass airfields may require greater take-off distances.

5.7 Greater take-off distance requirements will also apply to aerotow operations because of increased weight and drag. Aircraft performance characteristics are typically not published for these types of operations. However, one source [8] has been identified that provides take-off distance requirements for the use of the Falke SF25 C motor glider as the towing aircraft. This source identifies a take-off distance to 50 ft for conditions consistent with those typically anticipated at Bicester Airfield of around 600 m, around double the distance required when not towing. Tug tow aircraft can normally be expected to be more powerful than a motor glider. A proportionately smaller increase in take-off distance is therefore to be expected for these operations: i.e. less than double the standard value when not towing. On that basis the available runway length in excess of the standard take-off distance available at Bicester Airfield can be expected to be more than sufficient to support safe operations that will enable a tow operation to climb to a safe height before leaving the airfield boundary.

5.8 Referring to the runway elevation profile in Figure 4.4, it can be seen that the take-off run conducted from the northern end of the runway starts at an altitude of over 80 m AOD. It can be expected that aircraft will typically be airborne at or before the midpoint of the runway where the elevation is around 77 m AOD, at a point that is several hundred metres from the site boundary. For the climb performances of the types of aircraft normally employed for aerotow operations, that distance can be

expected to be more than sufficient to ensure a safe vertical margin with respect to buildings at the proposed development up to 84.8 m AOD.

5.9 Available flight manuals [8, 9] for Falke motor gliders of the type identified within the fleet at the BGC indicate a take-off distance to 50 ft of around 300 m for typical conditions at Bicester Airfield. Take-off directly over the site for these aircraft types will evidently not be limited by the proposed development.

5.10 It has been noted earlier that there are other powered aircraft operations at Bicester Airfield, including flights by vintage and other aircraft either based at or visiting the airfield. The information provided on the BGC website and reproduced at Appendix 1 indicates that powered aircraft use an area well to the east of the 17/35 no-go cable run area for take-off in the 17 direction that avoids flight directly over the development site. In that case, there would be no impacts on operations arising from the height of the buildings since there would be a considerable lateral clearance margin. If, in future, there were to be a requirement for take-off directly over the site in the 17 direction, the development might give rise to some operational constraints if these operations involved aircraft with more demanding requirements than those identified above for glider operations. However, in accordance with the points set out in paragraphs 5.3 and 5.4 any impacts would be expected to be limited and it would appear that alternative take-off runs would be available to accommodate the occasional take-off that might be affected by the building heights. Overall, it may be concluded that there will be no significant restrictions of 17 take-off operations of these types of aircraft arising from the proposed development.

5.11 For take-off in the 24 direction, operations to the north of the 06/24 no-go cable run area is laterally displaced well to the north of the site and there will be a sufficient lateral clearance margin to ensure the safety and efficiency of these operations. Take-off to the south of the 06/24 no-go cable run area would appear to bring aircraft close to the more northerly buildings of the proposed development. Assuming that a safe vertical margin would be required for these operations, the analysis presented earlier at paragraphs 5.6 to 5.9 in respect of the 17 direction take-off will apply. The take-off performance for the anticipated operations can be expected to be sufficient to ensure a safe vertical clearance margin.

Normal Landing Operations

5.12 Landing in the 06 direction to the south of the 06/24 no-go cable run area and in the 35 direction to the west of the 17/35 no-go cable run area may involve flight directly over the site. The potential impact of the development on these operations has therefore been considered. For landing in the 06 direction to the north of the 06/24 no-go cable run area and in the 35 direction to the east of the 17/35 no-go cable run area there will be a safe lateral clearance margin with respect to buildings of the proposed development and no adverse operational impacts are to be expected.

5.13 Safe approach and landing requires a sufficient vertical clearance margin between the approach path and obstacles along it for the risk of collision to be entirely negligible and an adequate length of runway in which the aircraft can come to a complete stop. Safe landing distances are typically defined in aircraft performance manuals in terms of both the distance required from a height of 50 ft and the length of the landing roll after aircraft have touched down. It is standard practice at runways with markings for aircraft to aim to cross the landing threshold at an appropriate safe height (nominally 50 ft, at least for commercial transport operations) and to touchdown some distance beyond the threshold. Aiming for a touchdown point some distance beyond the threshold provides a safety margin in respect of landing short or undershoot. A further

safety margin is provided by locating the threshold some distance into the airfield such that there is an obstacle free area along the approach path for some distance before the runway threshold.

5.14 The approach to the threshold follows a descending “glide path” down to the intended threshold crossing height. To ensure a safe approach, an appropriate vertical clearance margin with respect to obstacles along the approach path is required. Given the nature of the descent, the height of obstacles that may be accommodated safely along the approach path increases progressively with increasing distance from the runway. The obstacle heights that may be accommodated safely at any distance from the runway threshold will be dependent upon the glide path angle for the approach and the accuracy with which aircraft can maintain that nominally intended path.

5.15 The standards employed in the analysis presented in the ASA report seek to define the maximum obstacle height that can be safely accommodated along the approach in accordance with the principles set out in the preceding paragraph. The fundamental difficulty in applying those standards in this case, as a guide to the adequacy of the vertical margin that would be provided with respect to the proposed development, is that there are no runway markings and hence no defined runway threshold to provide a reference point.

5.16 In the absence of a specific reference point defined by runway markings, consideration can be given to anticipated safe operational practices. As noted earlier, an obstacle free area is provided at marked runways between the threshold and the airfield boundary. At unmarked runways, pilots will aim to land some distance into the airfield to provide an appropriate safety margin with respect to undershoot but not so far in that there would be a risk of overrunning the end of the runway before the aircraft has been brought to a complete stop. Referring to the landing distance required for the sorts of general aviation light aircraft employed in glider aerotow operations and the landing distance required for glider operations, it is evident that there is a considerable excess of landing distance available at Bicester Airfield. Accordingly, in order to achieve a sensible balance between the undershoot and overrun risk, it will be good practice for pilots to aim sufficiently far into the airfield for there to be an adequate vertical safety margin with respect to the buildings of the proposed development.

5.17 That general assertion may be validated as follows. At a maximum of 84.8 m AOD, the proposed buildings are slightly less than 10 m higher than the elevation of the relevant landing areas. It has previously been determined during a previous assessment [10] of similar types of operations that the 5% approach surface slope identified in CAP 168 standards and employed in the ASA report can generally be expected to be sufficient to ensure a safe vertical clearance margin on approach for both powered aircraft and gliders. Typical operational practice is for powered light aircraft to employ a glide path angle of 4 to 4.5° which is equivalent to around 7 to 7.9%. Use of a glide path angle of that order will provide an increasing vertical margin with respect to the 5% reference slope. In order for a 10 m obstacle to comply with the 5% approach surface, the standard would require a distance of not less than 200 m from the obstacle to the nominal landing threshold. Given the minimum distance of the buildings of the development from the airfield boundary is not less than about 100 m for any potential approach direction, that would place the required nominal threshold at around 100 m inside the boundary. That threshold location would leave substantially more than the landing distance required for the types of operations anticipated. It can therefore be concluded that the buildings of the proposed

development at the heights proposed will not present a threat to the safety of normal approach operations. Pilots will be able to aim far enough into the airfield during the approach to ensure a safe vertical margin whilst maintaining an adequate landing distance and safety margin in case of overrun.

5.18 In any event, if there were a concern about the erosion of this margin, it would be expected to affect a relatively small proportion of operations since there will normally be other options for the use of flight paths that do not pass directly over the buildings of the proposed development, either by using the other identified runway directions, where cross wind limits will allow, or by using an alternative part of the field for landing in the 06 or 35 directions. As discussed further in relation to undershoot risk, some alternative approach paths may generally be preferred.

EFATO and Other Problems on Take-off

5.19 Engine failure after take-off is a relatively common fault. For single engine aircraft such as the types used for aerotow operations, engine failure will lead to a forced landing. An incident rate for forced landing shortly after take-off of 3.9 per million take-off movements has previously been estimated [10] for single engine light aircraft on the basis of the recent historical incident and accident record. Due to the potential under reporting of incidents where forced landing is completed safely without injury or damage to the aircraft, this identified incident rate may be an underestimate. Other problems on take-off during glider aerotow launch, for example tow rope failure or other problems with tow rope management, may also lead to a requirement for a forced landing.

5.20 For pilots undertaking multiple take-off operations per year, the probability of involvement in a forced landing incident may be at a level that is non-trivial when compared with standards employed by the UK Health & Safety Executive for assessing the significance of risks to the public and workers. HSE criteria [11] identify risks of fatality in excess of 1 in 10,000 per annum to be “intolerable”. Risks below 1 in a million per annum may be considered broadly acceptable whilst risks between these two values are considered significant but may be considered tolerable but only in return for the benefits to be gained from the activity giving rise to the risk, provided that they are managed so as to be as low as reasonably practicable.

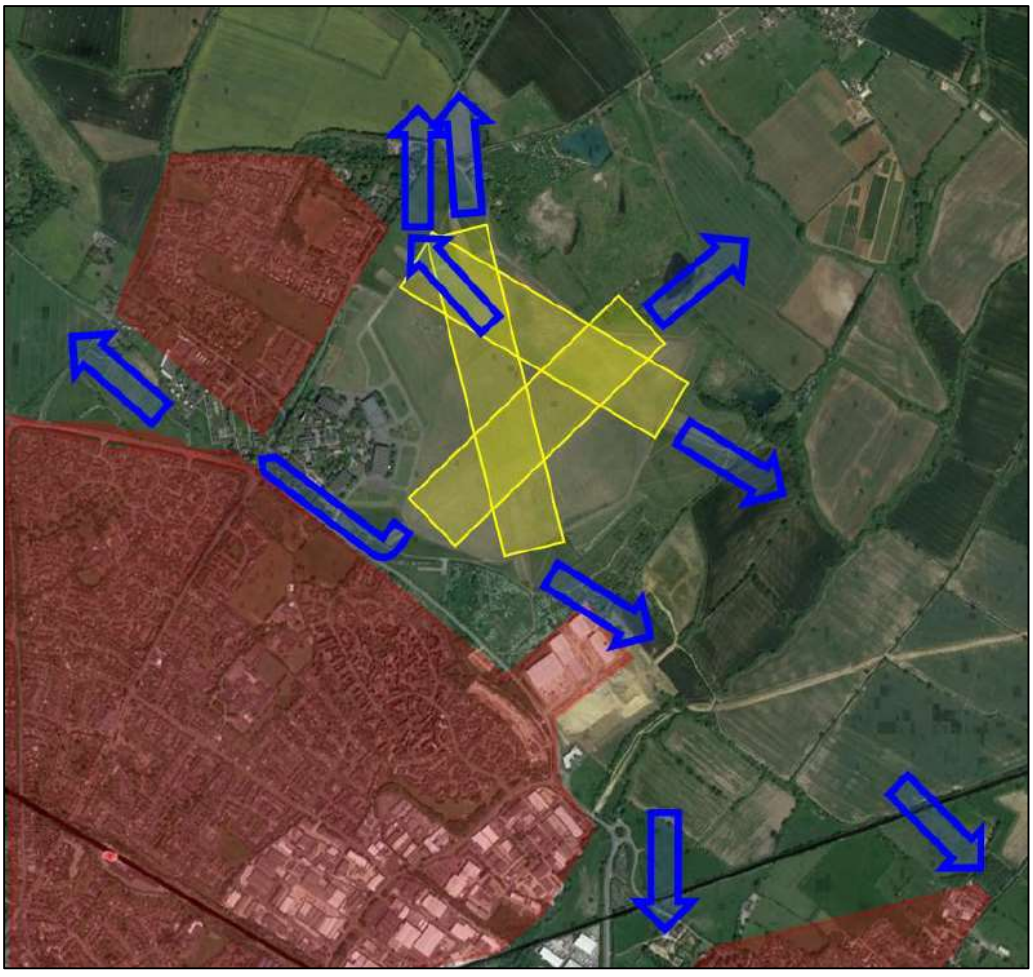
5.21 In order to mitigate this risk, it will be important for the operating environment at Bicester Airfield to provide opportunities for safe forced landing in the form of open and undeveloped areas along the take-off path. Given this requirement, the loss of suitable safe forced landing areas associated with a development proposal along take-off flight paths would be a potential concern. It has previously been identified as the sole reason for refusal of a development proposal that was upheld on appeal [7]. It is therefore important to demonstrate that the proposed F.A.S.T. development would not lead to a loss of open land that currently serves as a potential safe forced landing area, recognising that a substantial proportion of take-off operations make use of the 17 direction.

5.22 As has been noted earlier, the development site is currently predominantly hawthorn scrub with some very limited more open areas. The historical incident and accident record indicates that crashes into that sort of vegetation may often be survivable from the pilot’s perspective. Survivability in the event of collision with buildings can generally be expected to be lower. In that respect, the proposed development might be considered to degrade safety. However, it should be recognised that the site does not currently represent an attractive area for a safe forced landing. An effective safe

forced landing area which is substantially free of obstacles and sufficiently large to accommodate the landing distance requirements of the aerotow aircraft and the glider under tow is ideally required along the take-off path.

5.23 In order to minimise the risks associated with engine failure after take-off and maximise the chance of a successful safe forced landing, it can be expected that the selection of take-off flight paths will be informed by the obstacle environment. It is evident from the submissions of the BGC that this consideration is an important factor in their selection of the preferred runway for take-off. The diagram of flight paths they have provided, reproduced at Figure 5.1, clearly shows that take-off operations in the 17 direction preferably involve a turn to the left shortly after take-off which takes aircraft away from the development site. This turn is required to maintain options for safe forced landing and has apparently become all the more important recently due to new light industrial development located to the south-east of the F.A.S.T. site.

Figure 5.1: Flight paths employed for take-off at Bicester Airfield



5.24 Taking account of the considerations set out in the preceding paragraphs, it may be concluded that the impact of the proposed development on the safety of aircraft during a forced landing after take-off will be limited. The site is currently not an attractive area for forced landings, due to the hawthorn scrub vegetation present, although it is recognised that the F.A.S.T. development may make it slightly more unattractive. However, the primary consideration determining the possible impact of forced landings is that, in order to maintain effective options for a safe forced landing in the

current environment if required, take-off operations currently involve a turn away from the site shortly after aircraft become airborne. Overall, it can therefore be expected that the likelihood of there being a requirement for a forced landing at the site can be expected to be negligible.

Undershoot

5.25 Undershoot refers to incidents in which aircraft fail to reach the runway or other intended landing area during approach and touchdown before the intended location. As has been identified previously [10], this is a relatively common incident scenario and is of particular concern for glider operations for which there is no power available to correct for circumstances in which pilots have inadvertently found themselves too low in the approach to reach the airfield. Given the likelihood of these events, new developments in more critical areas along the approach may have the potential to compromise the safety of a significant proportion of undershoot incidents.

5.26 In order to mitigate the risk to aircraft during undershoot, it will be preferable for aircraft to follow obstacle free approach flight paths where practicable. The importance of wind direction and the presence of development in the selection of take-off direction has already been discussed. The same general principles apply: approach into the wind and over open areas free of development is preferred. On that basis, approach in the 24 direction can be expected to be strongly favoured because that direction is into the predominant wind and over open land to the east side of the airfield. The use of the 24 direction will avoid flight over the development site and the proposed development therefore cannot compromise the safety of undershoot incidents occurring during approach in that direction.

5.27 For approaches in the 06 and 35 directions, the possibility of flight directly over the F.A.S.T. site is identified. However, approach in these directions does not necessarily require flight over the site. In the case of approach in the 35 direction, it can be expected that areas to the east of the 17/35 no-go cable run will generally be preferred for the existing environment, in order to minimise undershoot risk. These approaches are over open farmland with hedgerows which offers the best chance of avoiding serious collision incidents. Similarly, for landing in the 06 direction, an approach path to the north side of the 06/24 no-go cable run will be preferred since that path will maximise the availability of open space. In both cases, the preferred approach path to a suitable landing area would avoid flight over the site. It can therefore be concluded that safety in the event of undershoot would not be compromised by the development under these circumstances.

5.28 The possibility of approach directly over the site during landing in the 06 and 35 directions cannot be discounted entirely. Scenarios can be identified in which the use of the preferred approach paths described in the preceding paragraph is precluded, for example by the presence of other aircraft that have recently landed and have yet to be cleared from the airfield. A change in weather conditions may lead to situations in which several aircraft will be seeking to land at the airfield in a short space of time. Without power to taxi out of the way, gliders must be retrieved and at busy times the landing area may become congested which may limit approach path options. Nevertheless, the judgement made here is that the occasions during which approach directly over the site will be required are likely to be quite limited. That judgement is made on the basis that 24 approach is more generally preferred given the prevailing wind conditions and that in wind conditions requiring 06 and 35 approach the

preferred approach path will avoid direct flight over the site to minimise undershoot risks associated with the current obstacle environment.

5.29 The overall conclusion to be drawn from the assessment of undershoot scenarios is therefore that the proposed development is unlikely to significantly compromise the safety of approach operations in which undershoot occurs.

Overrun

5.30 Overrun, which may occur on take-off or landing, refers to runway operations in which aircraft run off the end of the runway on the ground. Overrun is identified from the historical incident and accident record as a fairly common scenario for which the associated risks can be effectively mitigated by ensuring that a safety buffer of obstacle free space is available beyond the runway.

5.31 Some consideration has been given to take-off distance and landing distance requirements for aircraft operating at Bicester Airfield in the assessment of potential impacts of the development on normal take-off and landing operations. Those considerations have indicated that the distances available will typically exceed the anticipated typical requirements by a sufficient margin to provide an adequate buffer to contain reasonably foreseeable overruns within the operational area of the airfield. The likelihood of overrun outside the airfield into the site is therefore expected to be remote.

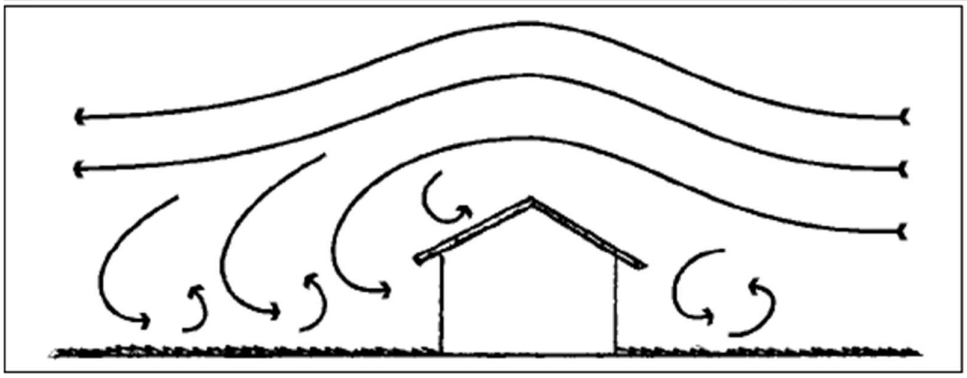
5.32 Given that the buildings of the proposed development are located on the far side of the site from the airfield boundary an additional buffer is available beyond the boundary before any substantial new structure will be encountered. The design and access statement for the proposal indicates that the area between the buildings and the airfield will be subject to some scrub clearance and that existing structures associated with the scheduled ancient monument in that area will be retained. Overall, it may therefore be concluded that the proposed development will not significantly compromise the safety of overrun incidents.

Potential building wake turbulence impacts

5.33 Though not raised in any of the documents associated with the development proposal, the potential impacts on operations arising from turbulence caused by buildings of the proposed development have subsequently can be identified as a generic potential concern that merits some attention.

5.34 Any new building in a generally open environment such as that at the application site can be expected to alter wind flows across the area. Air flows must move upwards when meeting the building, resulting in a corresponding downward flow of air downstream of the building and turbulence downstream. These airflows are shown schematically in Figure 5.2.

Figure 5.2: Schematic Airflows and Turbulence Generated by a Building



5.35 Specific comment is made on the BGC website on turbulence associated with existing obstacles, as follows:

On windy days, turbulence can occur close to the hangars if we are using 060, and near the very tall trees around the square lake, between the 240 and 310 landing areas, where strong sink may be encountered.

Given the close proximity of the hangers to the 06 approach to landing to the north side of the 06/24 winch run, turbulence across the approach path may evidently arise when there is a slight cross wind component on approach associated with wind from a direction to the north of the 06 approach path. It can be envisaged that 35 approach with a wind direction to the west of the 35 direction could similarly give rise to turbulence across the approach path.

5.36 The detailed assessment of potential turbulence impacts is technically complex and outside the scope of this assessment. However, the likely scale of any impacts associated with the proposal can be put into perspective by comparison with the turbulence impacts that are currently accommodated at Bicester Airfield. Based on the information available in the design and access statement for the proposal, it appears that the existing hangars are somewhat taller than the buildings of the proposed development. For example, Figure 23 in the design and access statement identifies a hangar height of 96.7 m AOD. Based on the comparative heights of these existing structures and the building of the proposed development and having further regard to their relative proximities to flight paths, it is to be expected that any turbulence impacts that might arise from the proposed development would be on a smaller scale than those currently accommodated at Bicester Airfield due to the existing obstacle environment. On that basis, it is judged that any additional building wake turbulence impacts on 35 approaches that might arise from the proposal are unlikely to be significant.

Summary of Assessment Findings

5.37 The safeguarding assessment has made reference to operational practices at Bicester Airfield identified by the Bicester Gliding Centre to determine the likely impacts on normal take-off and landing operations and the reasonable foreseeable incidents scenarios of engine failure on take-off or other precursors leading to forced landing, undershoot on landing and overrun. Some consideration has also been given to possible building wake turbulence impacts. The findings of the assessment may be summarised as follows:

- No significant impacts on normal take-off operations are expected. Preferred flight paths for take-off can generally be expected to avoid direct flight over the development site and a safe lateral clearance margin is therefore expected to be

maintain with respect to the proposed buildings. In the event that there was an operational requirement for take-off directly over the site the take-off and climb performance of the aircraft using the airfield is expected to be sufficient to ensure a safe vertical margin with respect to the proposed buildings.

- No significant impacts on normal landing operations are expected. For the most part, approach operations are expected not to involve direct flight over the site due to existing operational considerations, for example including the minimisation of undershoot risk. In that case, aircraft can be expected to maintain a safe lateral clearance margin with respect to the proposed buildings of the development. In the event that there was an operational requirement for approach directly over the site then it is expected that a safe vertical margin with respect to the proposed buildings could be maintained. It is expected that pilots will generally follow established good practice and aim sufficiently far into the airfield for there to be an adequate vertical safety margin with respect to the buildings of the proposed development.
- No significant impact is expected on the safety of forced landing shortly after take-off that may be required following engine failure or other precursor events. In order to maintain effective options for a safe forced landing in the current environment if required, take-off operations currently involve a turn away from the site shortly after aircraft become airborne. Accordingly, the likelihood of a forced landing at the site is therefore expected to be very remote. The site is currently not an attractive area for forced landings, due to the hawthorn scrub vegetation present. Although it is recognised that the F.A.S.T. development may make it slightly more unattractive, the likelihood of the site providing any real benefit for forced landing with or without the development is expected to be minimal.
- No significant impact is expected on the safety of undershoot on landing for reasons similar to those identified above in respect of forced landing on take-off. It is expected that current operational practice will generally lead to direct flight over the site being avoided.
- No significant impact is to be expected on the safety of overrun incidents. The space available within the airfield is expected generally to be able to provide adequate safety margins in respect of this scenario. Given the location of the proposed buildings at the site and the plans for scrub clearance at the site, the development proposals are not expected to significantly compromise the safety of aircraft in the event of an excursion beyond the airfield into the development site.
- Whilst some additional building wake turbulence might be generated across approach paths by the proposal under some wind conditions, any impacts on the safety of approach operations are expected to be minor. Based on the comparative heights of some existing hangars that are currently identified as giving rise to turbulence impacts and the buildings of the proposed development and having further regard to their relative proximities to flight paths, it is to be expected that any turbulence impacts that might arise from the proposed development would be on a smaller scale than those due to the existing obstacle environment that are currently accommodated at Bicester Airfield.

6 Conclusions

6.1 The appraisal of the applicant's aviation report undertaken as part of this safeguarding review has shown that the general approach to the assessment of potential impacts on operations at Bicester Airfield that has been employed is not appropriate. The following key deficiencies in the assessment presented in the report have been identified:

1) The use of obstacle limitation surface criteria defined to support the licensing of aerodromes is not an appropriate basis for assessing impacts on normal glider airfield operations. A specific assessment of the relevant operations is required.
2) In any event, the obstacle limitation surface criteria have not been appropriately applied.
3) The assumed runway direction for operations over the development site employed in the assessment is incorrect.
4) The assessment has not considered the full range of options for take-off and landing in any given direction that is available at the grass airfield.
5) Assumptions concerning the usage of different runway directions are incorrect.
6) The assessment of impacts associated with the loss of land for possible use to support safe forced landings is superficial and is based on incorrect assumptions concerning the proportion of operations that may be affected.
7) There are other potential adverse impacts of possible concern that have not been considered in the ASA Report.

It is concluded that the ASA Report does not provide a sound basis for supporting the determination of the application.

6.2 The review of the submissions of the BGC and the GAAC has identified no firm technical basis presented in them to demonstrate any material adverse impact on glider operations or any other reasonably foreseeable future aircraft operations at Bicester Airfield. The BGC have indicated that the F.A.S.T centre should have limited impact on the current gliding and powered aircraft operations at Bicester Airfield. They raise broader concerns about the possibility of the development compromising future gliding operations alongside increased levels of operation by powered aircraft. The technical basis for these concerns is not set out in any detail in the submissions from the BGC and would appear to be based on speculation about the possible future development of powered aircraft operations alongside current glider operations which is ill-defined. It is concluded that the BGC and GAAC submissions do not present any aviation-related grounds for refusal of the application.

6.3 The independent operational safeguarding assessment undertaken as part of this overall review indicates that the proposed F.A.S.T. development appears to be unlikely to have any significant adverse impacts on glider operations or any other reasonably foreseeable future aircraft operations at Bicester Airfield. The assessment has made reference to operational practices at Bicester Airfield identified by the BGC to determine the likely impacts on normal take-off and landing operations and the reasonable foreseeable incidents scenarios of engine failure on take-off or other precursors leading to forced landing, undershoot on landing and overrun. Further consideration has also been given to possible building wake turbulence impacts. The validity of these findings will be dependent to some extent upon the interpretation of

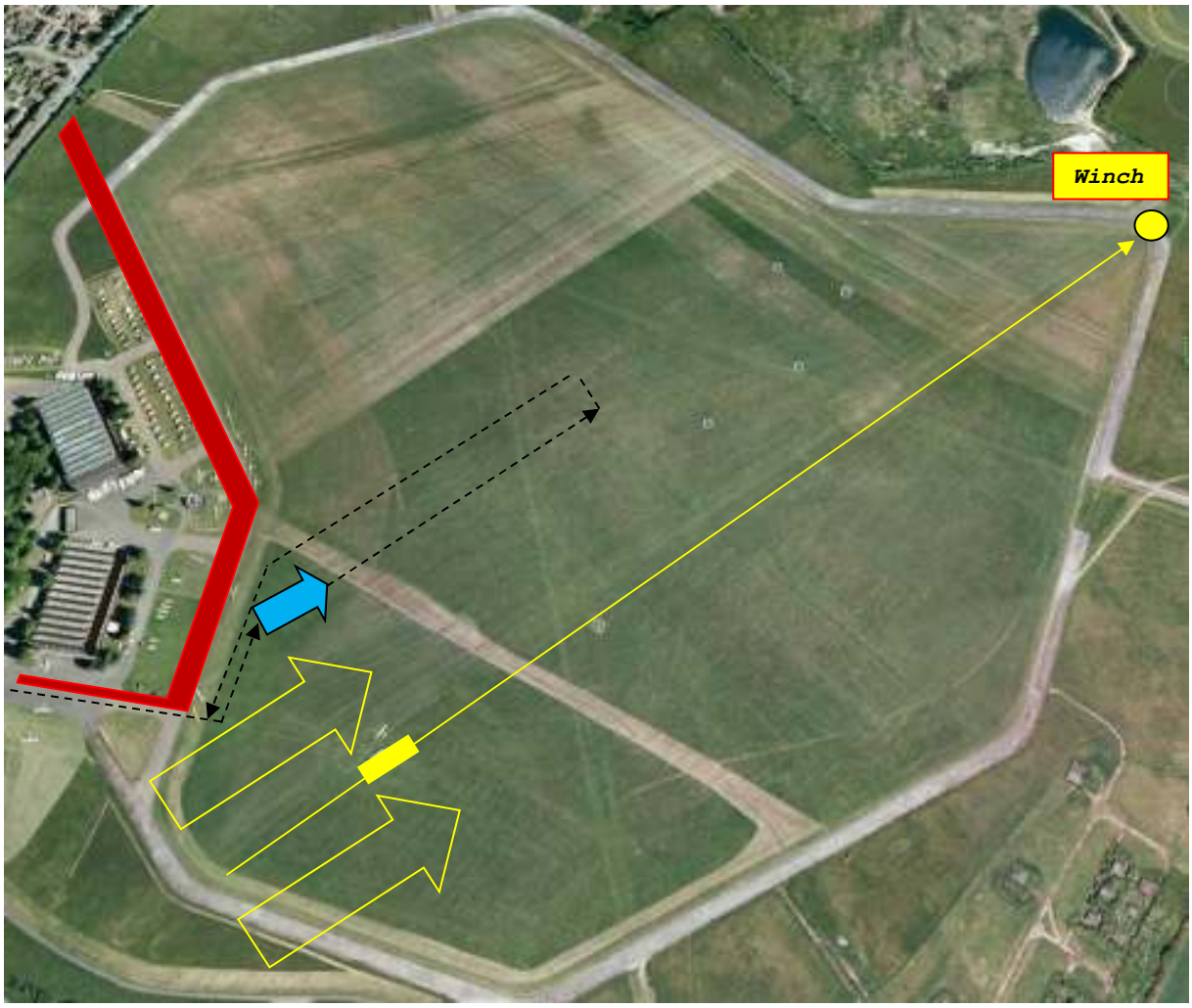
the publicly available information concerning operations that forms the basis of the assumptions underpinning the assessment. The interpretation of this information and the associated assumptions are considered to be reasonable though it is accepted that some details of the operational practices in use may differ from those assumed. Unless additional information is provided by those responsible for operations at Bicester Airfield showing that the assumptions are not appropriate and that operations are materially different from those assumed, it will be reasonable to conclude that the F.A.S.T development will not have a material adverse impact on the safety and efficiency of aircraft operations at Bicester Airfield.

References

1 CAP168 Edition 11 Licensing of Aerodromes, UK Civil Aviation Authority, January 2019
2 ICAO Annex 14 Eighth Edition, International Civil Aviation Organisation, July 2018
3 ICAO Doc 7341-AGA/591: Aerodromes, air routes and ground aids division: report of fifth session, Montreal, 1952
4 BGA Site Operations Manual Chapter 12: Airfield Safeguarding - How Planning Can Protect You, British Gliding Association
5 Fact Sheet 3 - Safeguarding your flying site. General Aviation Awareness Council, November 2015
6 Aviation Safeguarding Rebuttal Proof of Evidence presented by Mark Eddowes at the Public Inquiry into the Proposed Poultry Farm at Rufforth (16/01813 FULM) Appeal reference APP/C2741/W/19/3223376
7 Appeal decision of Katie McDonald, October 2019, Appeal reference APP/C2741/W/19/3223376
8 Flight manual and maintenance manual for Flake SF 25C motor glider, including use for tow launch operations, available at https://www.dsft.co.uk/resources/GCDSC_POH.pdf
9 Flight manual and maintenance manual for Flake SF 25C motor glider, available at http://www.scheibe-aircraft.de/TM%20LTA/Handbuch/pdf/FHB_SF25C_R7_EN_SA.pdf
10 Proposed Poultry Farm at Rufforth (16/01813 FULM): Aviation Safeguarding Assessment, report prepared by Eddowes Aviation Safety Limited for the City of York Council, November 2017
11 Reducing risks, protecting people, HSE's decision-making process, HSE 2001

Appendix 1: Operational Areas identified by the Bicester Gliding Centre

C/S - Bicester Radio - 129.980 MHz **267 ft AMSL**



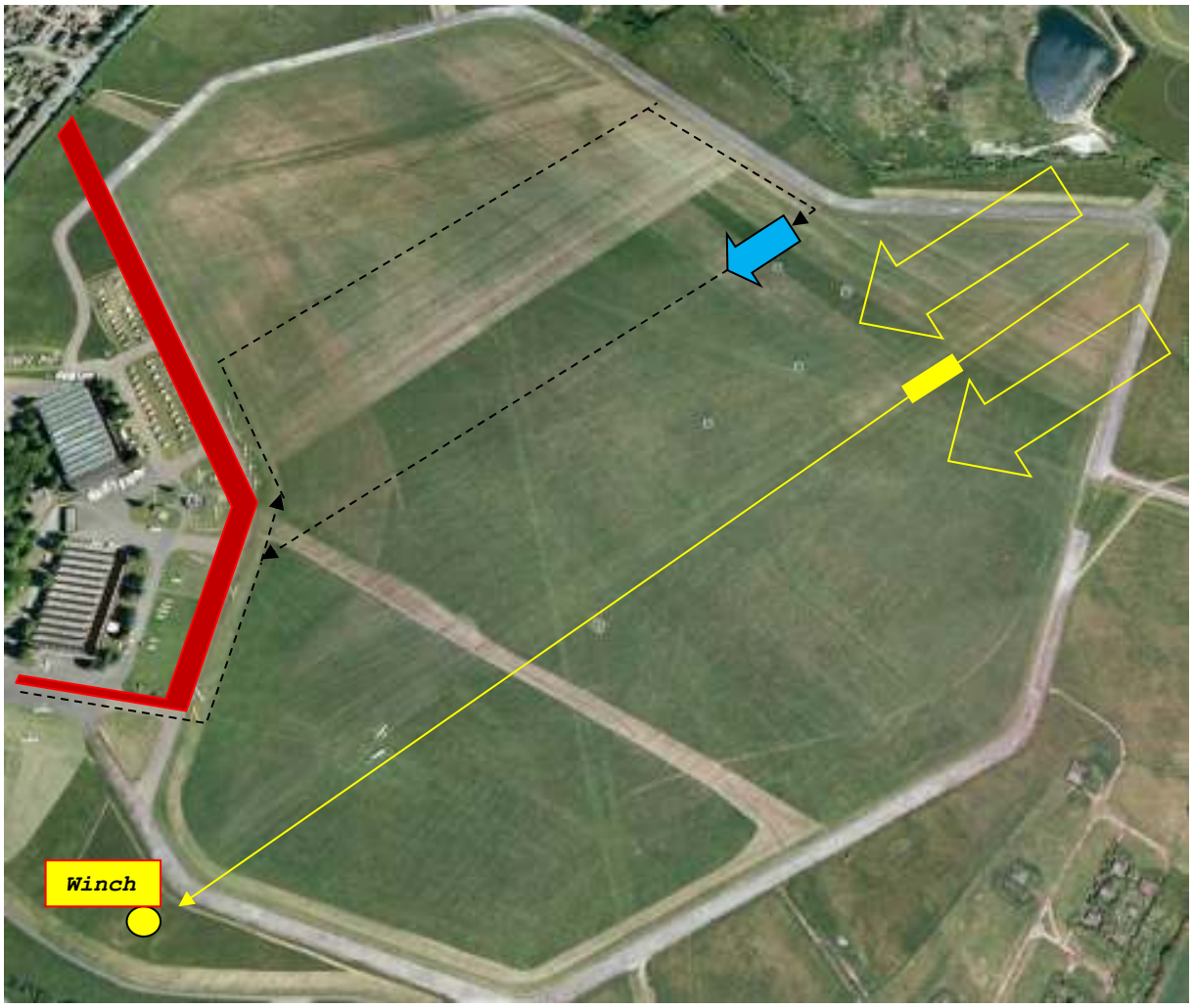
Runway 06

- Glider take-off and landing areas

- Powered aircrafts take-off and landing areas

---------- - Directions for taxi to / from take-off / landing area of powered aircrafts

C/S - Bicester Radio - 129.980 MHz **267 ft AMSL**



Runway 24

- Glider take-off and landing areas

- Powered aircrafts take-off and landing areas

---------- - Directions for taxi to / from take-off / landing area of powered aircrafts

C/S - Bicester Radio - 129.980 MHz **267 ft AMSL**

Runway 36

- Glider take-off and landing areas

- Powered aircrafts take-off and landing areas

---------- - Directions for taxi to / from take-off / landing area of powered aircrafts

C/S - Bicester Radio - 129.980 MHz **267 ft AMSL**

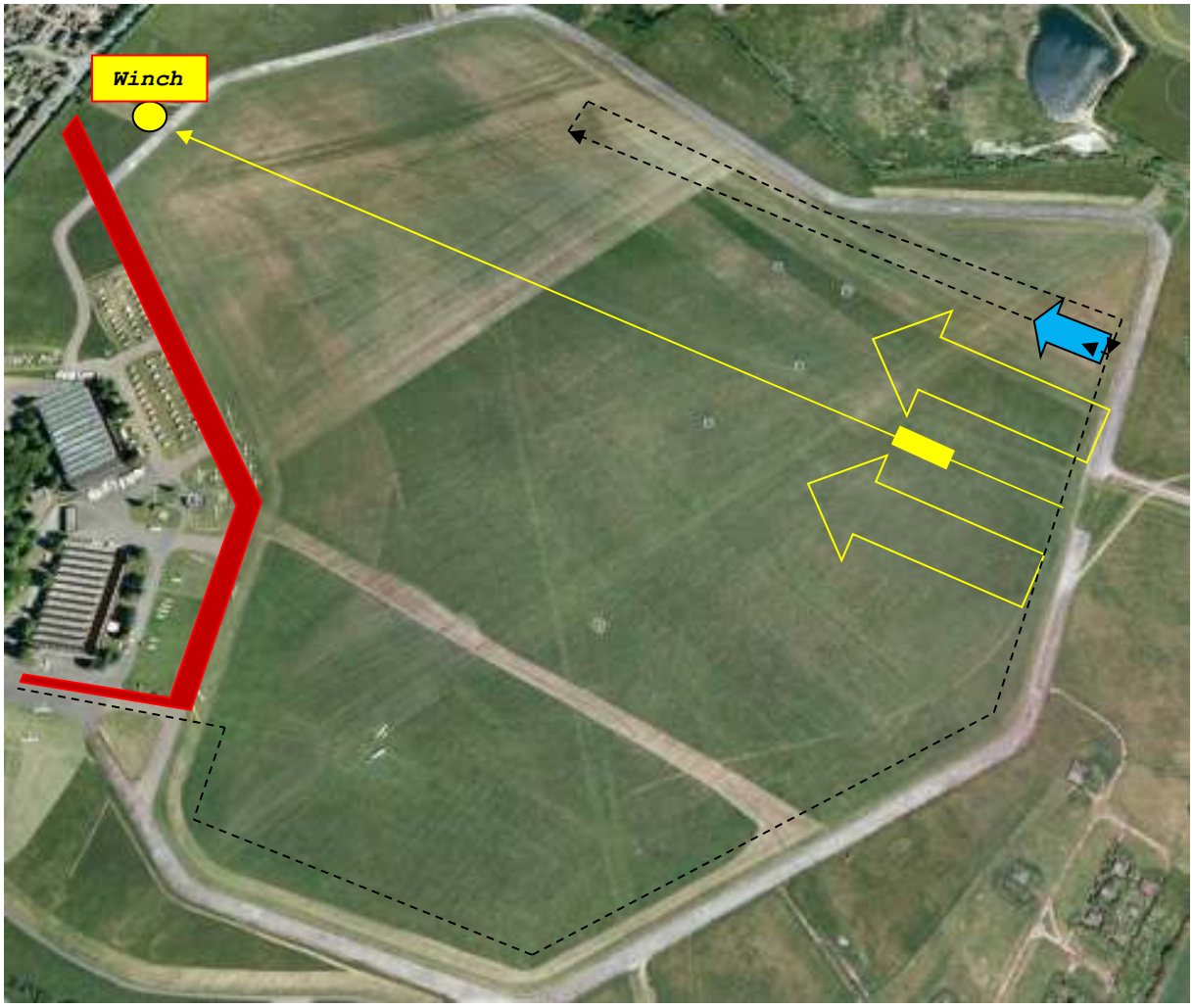
Runway 18

- Glider take-off and landing areas

- Powered aircrafts take-off and landing areas

---------- - Directions for taxi to / from take-off / landing area of powered aircrafts

C/S - Bicester Radio - 129.980 MHz **267 ft AMSL**



Runway 31

- Glider take-off and landing areas

- Powered aircrafts take-off and landing areas

---------- - Directions for taxi to / from take-off / landing area of powered aircrafts

C/S - Bicester Radio - 129.980 MHz **267 ft AMSL**

Runway 13

- Glider take-off and landing areas

- Powered aircrafts take-off and landing areas

---------- - Directions for taxi to / from take-off / landing area of powered aircrafts