APPENDIX A2

ARCADIS Design & Consultancy for natural and built assets

HAZARD LOG REPORT

for the IFA2 Interconnector at Solent Airport

35588103/RP/080917/3 Addendum 1

NOVEMBER 2017

Incorporating

EC HARRIS BUILT ASSET CONSULTANCY

Hyder

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VERSION CONTROL

Issue	Revision No.	Date Issued	Description of Revision: Page No.	Description of Revision: Comment	Reviewed By:
1	1	04/09/2017	Draft Report issued for comment.		S Scannali
1	2	06/10/2107	Comments provided on Revision 1 addressed	Various comments throughout	S Scannali
	3	10/11/2017	Comments provided by FBC on Revision 2 addressed	Various comments throughout	S Scannali

TABLE OF CONTENTS

EXECUTIVE SUMMARY

National Grid Interconnector Holdings (NG) is developing and implementing an electricity interconnector facility. The facility (referred to as IFA2) is being developed jointly with Reseau de Transport d'Electricite (RTE), the French transmission system owner and operator. It links the United Kingdom's electricity transmission network with France's, and helps to enhance the security, affordability and sustainability of energy supply to both countries.

The facility consists of two converter stations, one sited in each country. It is to be sited to the north-east of Solent Airport, with high-voltage direct current (HVDC) and high-voltage alternating current (HVAC) cables proposed to be routed in the same cable corridor to the west and north of the main runway.

Over 2016 and 2017, NG, in agreement with Fareham Borough Council (FBC) and Regional and City Airports Management (RCAM); the airport operator, commissioned analysis and assessment to determine whether the siting of the converter station at Solent Airport could impact the airport's operations. These assessments also help to address local concerns over the proposals to site the converter station at Solent Airport and have been provided as supporting information to the planning and public consultation process being led by FBC.

As part of this work, NG jointly with FBC commissioned Arcadis to undertake technical assessment of the converter station to support the planning and land acquisition process. The assessment includes a functional hazard assessment (FHA), in accordance with Civil Aviation Authority (CAA) standard CAP 760 [1] and the development of a hazard log. The hazard log is used as a tool to track the risk management process as the project lifecycle progresses.

This addendum documents in detail the results of the FHA and the status of the hazard log at this point in time when the project is a significant way through the detailed design process. This document, therefore supports the interim safety justification for the IFA2 facility at Solent Airport [2].

The hazard log continues to be used to track hazards as the project progresses. For ease of ongoing management, all the risk mitigation measures in Appendix C of this hazard log are being tracked as dependencies required to be fulfilled to meet safety requirements, together with a risk mitigation plan which is presented in the safety justification document [2]. The risk mitigation plan is being updated regularly throughout the hazard management phase. At the end of the testing and commissioning phase and prior to the commencement of operation, all the dependencies will be confirmed as complete and hazards confirmed as closed with risks acceptable and ALARP.

The scope of the safety assessment and the hazard log considers the effects of the IFA2 facility upon Solent Airport's operations, and has identified 28 hazards arising from 36 causal factors. Some of the hazards identified initially have been merged or closed; 16 hazards remain open. However, completion of the dependencies as discussed above will close these and ensure that any potential safety risks presented by the IFA2 facility upon Solent Airport's operations are considered acceptable. With the robust body of evidence in place so far as described in the safety justification document [2], there is a high level of confidence that the potential safety effects presented by the IFA2 facility on Solent Airport's operations can all be successfully managed to closure.

REFERENCES

Ref No	Reference Identifier	Title
1	CAP 760	Civil Aviation Procedure (CAP 760) Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases.
2	35588103/RP/080917	Safety Justification for the IFA2 Interconnector at Solent Airport Daedalus.
3	35588100/NT/300916/2	Technical Assessment (Hazard Log) of the possible impact of the IFA2 Interconnector at Solent Airport Daedalus.
4	CIMS/RCA/DA/GT 11.0 & CIMS/RCA/DA/GT 12.0	Regional & City Airports Management: Daedalus: Safety Management System (SMS) Incorporating the Aerodrome Manual/
5	-	IFA2 Interconnector: Daedalus FHA Briefing Note, Arcadis, August 2016.
6	BS 5489-1:1203	Code of practice for the design of road lighting: lighting of roads and public amenity areas Part 1 Lighting of roads and public amenity areas.
7	-	Draft Daedalus Masterplan – 12 October 2016
8	25-7-17 MoM	Minutes of meeting on 25 July 2017 at Lee-on-Solent Airport to discuss IFA2 – MCA Interface and Equipment.
9	35588102/RP/080517/2	Hazard Log Report Technical Assessment of the possible impact of the IFA2 Interconnector at Solent Airport Daedalus.

TERMS AND DEFINITIONS

Term/Abbreviation	Definition
AC	Alternating Current
AFTN	Aeronautical Fixed Telecommunications Network
AGL	Airfield Ground Lighting
Airport, the	Solent Airport at Daedalus
CAA	(UK) Civil Aviation Authority
CAP	Civil Aviation Publication
CDM	Construction (Design and Management)
Control Tower	The Daedalus control tower
DC	Direct Current
DI	Direction Indicator
EMI	Electromagnetic Interference
FBC	Fareham Borough Council
FHA	Functional Hazard Assessment
FIS	Flight Information Service
FISO	Flight Information Service Officer
HIRA	Hazard Identification and Risk Assessment
HV	High Voltage
IFA2	Interconnexion France-Angleterre 2
ILS	Instrument Landing System
kV	Kilovolt
LED	Light-Emitting Diode
LSH	Lambert Smith Hampton
LV	Low Voltage
MCA	Maritime and Coastguard Agency
NATS	National Air Traffic Services
NG	National Grid Interconnector Holdings Limited
RCAM	Regional and City Airports Management
RF	Radio Frequency
RFI	Radio Frequency Interference

Term/Abbreviation	Definition
SMS	Safety Management System
Solent Airport	Solent Airport at Daedalus
UAV	Unmanned Aerial Vehicle
UHF	Ultra-High Frequency
VHF	Very High Frequency

1 INTRODUCTION

National Grid Interconnector Holdings (NG) is proposing to develop and implement a new electricity interconnector facility, the Interconnexion France-Angleterre 2 (IFA2). The facility is being developed jointly with Réseau de Transport d'Electricité (RTE), the French transmission system owner and operator. It will link the United Kingdom's electricity transmission network with France's, and is expected to help enhance the security, affordability, and sustainability of energy supply to both countries.

The facility consists of two converter stations, one sited in each country. The UK converter station is to be sited to the north-east of Solent Airport at Daedalus ("Solent Airport"). National Grid proposes to route high-voltage direct current and high-voltage alternating current cables in a shared cable corridor to the west and north of the Solent Airport main runway.

This is a report of the hazard identification and risk assessment process, including an update of the hazard log at this point in time when the project is a significant way through the detailed design process. The hazard log will be used to track hazards as the project progresses and hazards confirmed as closed when all of the risk mitigation is complete and prior to operation.

All hazards identified are shown on the hazard log forms in Appendix A of this report. The causal factors giving rise to those hazards are shown in the causal factor record sheets in Appendix B. The controls, mitigations, and actions identified in the FHA meetings are shown in Appendix C

2 FUNCTIONAL HAZARD ANALYSIS PROCESS

The Functional Hazard Analysis (FHA) is part of a systematic a process to:

- identify ways in which the proposed IFA2 installation might impair the safety of air traffic operations at Solent Airport (hazards);
- identify how severe such impairment might credibly be;
- estimate the approximate likelihood of such impairment where possible.

FHA has been carried out to consider any possible adverse effects of the proposed IFA2 facility upon the Airport, taking into consideration the likely future airport developments and the surrounding businesses as defined in the Masterplan [7].

The means of managing risk is identified through the overall risk management process as the design progresses through the project lifecycle, however, possible ways to manage risks identified during the FHA are recorded in the hazard log, which can be used to help manage the risks downstream.

Two FHA workshops were held as follows, both were coordinated by Arcadis and facilitated by TGR Safety Management Ltd:

- The first FHA workshop [3] was carried out on the 24th August 2016 and subject matter experts from National Grid, FBC, RCAM and Arcadis participated. This considered possible effects of the IFA2 facility on existing Airport operations.
- The second FHA workshop [9] was held on the 11th and 12th April 2017 to review the first assessment in the light of the likely future airport developments as well as developments in the control measures for hazards. This was attended by experts from National Grid, FBC, RCAM and Arcadis, the main IFA2 contractors and Lambert Smith Hampton (LSH) (the Commercial Agents) as listed in Appendix D. This ensured comprehensive coverage and representation from all the specialist areas necessary to identify hazards and assess risks.

A briefing note [5], describing the FHA process, was issued to participants before both workshops.

Subsequent to the workshops, a number of hazard review meetings have been held to develop the risk mitigation evidence as follows:

- Hazard Review Meeting on the 25/5/17 (attended by RCAM, NG, FBC, Arcadis)
- Hazard Review Meeting 27/6/17 (attended by NG, Arcadis)
- Review of mitigation plan 21/7/17 (attended by FBC, Arcadis).
- Review of MCA hazards 21/7/17 (attended by MCA, RCA, Arcadis).
- Hazard Review Meeting 10/8/17 (attended by RCAM, NG, FBC, Arcadis)
- Review of Hazard Log Actions 23/8/17 (attended by FBC, NG, Arcadis).

Liaison with the converter station Main Contractor (ABB) and HV cable contractor (Prysmian) has taken place through conference calls and NG/contractor liaison meetings as the design has developed.

The meeting held with MCA [8] on the 21/7/17 considered the possible effects of the IFA2 facility on that agency, and the hazard log has been updated to include the results of that meeting.

Risk is a combination of the likelihood and severity of hazards. At the time of the first workshop, lifecycle hazard mitigation measures were not fully defined, so in most cases the first FHA meeting identified only the severity and not the likelihood of hazards. As the mitigation measures were more firmly specified at the time of the second workshop, in most cases likelihoods have now been assigned.

Severity and likelihood classifications from Solent Airport's SMS [4] were used, which are identical to those of CAP760 (Section 4.7) but also include Solent Airport's processes for managing safety risk.

In cases where a need for further research or investigation is identified, the likelihood given is a worst-case estimate by the participants at FHA meeting, and the actions can be closed provided the research or investigation concludes that the likelihood is no worse than that identified. In cases where further design work is required, or controls and mitigations are still to be implemented, the likelihood given is the maximum

target likelihood that would ensure that the risks will be acceptable. The likelihood categories may be reviewed at the end of the design process by those who have responsibility for mitigating the risks.

This study is focussed on assessing the effects of the IFA2 facility upon airport operations only. It does not consider potential causes of hazards which could affect airport operations arising from sources within the Airport. Step 7 of CAP 760, “Claims, arguments and evidence that the safety requirements have been met and documenting this in a safety case” can only be fulfilled so far as the assumptions and boundaries of this study allow, that is, only in respect of the IFA2 facility and within the limits of the equipment and infrastructure on the agreed Masterplan [7]. The work reported in this document can be used to support, but will not itself provide, a safety case for the airport, as the safety case for the airport will need to address all hazards arising from all relevant equipment and operations

Within this document, all likelihoods assigned are those due to the effects of IFA2 only. It should be noted that the hazards might also be caused in ways that are independent of IFA2. All credible causes of hazards should be considered when assessing the overall airport risk. CAP760 Chapter 3 Section 5.8 describes the process by which allowance can be made for multiple possible causes of hazards.

Hazard record sheets developed to record all hazard related information are included in Appendix A and have assigned actions for the risk controls and mitigations to “owners”, whom the participants in the FHA considered to be the organisations best placed to progress the actions. These assignments are:

- NG;
- FBC; and
- RCAM.

Owners of actions and mitigation measures have changed as the project progresses, the risk mitigation plan has been used to define the latest action and owner at any point in time. The airport operator, RCAM, retains ultimate responsibility for ensuring risk control and mitigation measures relating to airport operations are adequately implemented.

3 SUMMARY OF RESULTS

This section of the report summarises the results of the FHA, listing hazards from highest to lowest consequence severity.

3.1 "Accident" Severity

No hazards were identified as having the severity of Accident.

3.2 "Serious Incident" Severity

The definition of "Serious Incident" in CAP760 [1] and the Solent Airport SMS [4] is:

Serious Incident - as defined in Council Directive 94/56/EC1 for air traffic services.

For the aerodrome, an event where an accident nearly occurs. No safety barriers remaining. The outcome is not under control and could very likely lead to an accident. Damage to major aerodrome facilities. Serious injury to staff/members of public at the aerodrome.

One hazard HAZ20 (High 50Hz impressed voltages or touch potentials due to LV cabling or fencing) falls into this severity category. However, through the mitigation measures identified during the FHA, including detailed surveys being undertaken and any LV cables identified during excavations, the hazard and hence the risk is to be eliminated by design.

3.3 "Major Incident" Severity

No hazards were identified as having the severity Major Incident.

3.4 "Significant Incident" Severity

The definition of "Significant Incident" in CAP760 [1] and the Solent Airport SMS [4] is:
Significant incident involving circumstances indicating that an accident, a serious or major incident could have occurred, if the risk had not been managed within safety margins, or if another aircraft had been in the vicinity.

A significant reduction in safety margins but several safety barriers remain to prevent an accident.

Reduced ability of the flight crew or air traffic control to cope with the increase in workload as a result of the conditions impairing their efficiency.

Only on rare occasions can the occurrence develop into an accident.

Nuisance to occupants of the aircraft or staff/members of public at the aerodrome.

The FHA identified the severity of the following open hazards to be Significant Incident:

- HAZ01: Distraction of aircrew;
- HAZ02: Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on);
- HAZ03: Bird strike;
- HAZ10: Distraction of control tower staff;
- HAZ11: Impaired ground to ground communications;
- HAZ17: Terrorist attack on IFA2;
- HAZ18: Exposure of public and workers to excessive magnetic fields;
- HAZ19: Incorrect magnetic compass reading;
- HAZ21: Loss of control of Unmanned Aerial Vehicle (UAV);
- HAZ22: Fire and smoke;
- HAZ24: Incorrect ground lighting intensity; and
- HAZ25: Wrong or no altimeter reading.

The acceptable likelihood for hazards with severity Significant Incident is Remote, defined in CAP760 and the Solent Airport SMS as:

Unlikely to occur during the total operational life of the system.

10^{-5} to 10^{-7} per hour.

Once in 10 years to once in 1000 years.

The FHA meetings did not anticipate any difficulties meeting a likelihood of Remote or better for any of these hazards. However, the meetings did not assign a likelihood to HAZ17 because that hazard is subject to a separate threat assessment.

3.5 Severity not Assigned

The FHA meetings did not assign severities to the following hazards, which relate to the interface of IFA 2 with third party systems:

- HAZ26 Unknown effect on MCA;
- HAZ27: Unknown effects on Britten-Norman operations; and
- HAZ28: Unknown effect of NATS operations.

Liaison has taken place with all these agencies to understand any potential hazards related to IFA 2. These hazards are subject to the third-party safety management system, including their criteria for tolerable risk, hence they have not been ranked. For these hazards, the objective is to demonstrate with the highest level of confidence, based on CAP 760 guidelines, that there are no adverse impacts that would impact the third-party system from introducing the IFA 2 facility at Solent Airport.

4 CONCLUSIONS

The safety assessment of the effect of the IFA2 facility on Solent Airport's operations identified 28 hazards arising from 36 causal factors. Some of the hazards have been merged or closed; 16 remain open. The hazard log continues to be used to track hazards as the project progresses. For ease of ongoing management, all the risk mitigation measures in Appendix C of this hazard log are being tracked as dependencies required to be fulfilled to meet safety requirements, together with a risk mitigation plan which is presented in the safety justification document [2]. The risk mitigation plan is being updated regularly throughout the hazard management phase. At the end of the testing and commissioning phase and prior to operation, all the dependencies will be confirmed as complete and hazards confirmed as closed with risks acceptable and ALARP.

The scope of the safety assessment and the hazard log considers the effects presented by the IFA2 facility upon Solent Airport's operations, and has identified 28 hazards arising from 36 causal factors. Some of the hazards identified initially have been merged or closed; 16 hazards remain open. However, completion of the dependencies as discussed above will close these and ensure that any potential safety effects presented by the IFA2 facility upon Solent Airport's operations is acceptable. With the robust body of evidence in place so far as described in the safety justification [2], there is a high level of confidence that the potential safety effects presented by the IFA2 facility on Solent Airport's operations can all be successfully managed to closure.

APPENDIX A HAZARD RECORD SHEETS

A.1 HAZ01

Identified By		**Date Created**	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-17	
Description			
Distraction of aircrew			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF01	Distraction of aircrew at night caused by lighting from the facility - building and security lighting	Human Factors	Extremely Improbable
CF02	Distraction of aircrew at night caused by reflection from building structure and cladding	Human Factors	Extremely Improbable
CF04	Communication interference, impacting the workload of the staff in control tower or aircrew (e.g. dealing with instrumentation and radio problems).	Human Factors	Extremely Improbable
CF05	Noise from IFA2 facility causes a distraction.	Human Factors	Extremely Improbable
CF06	Pilots under training who are not accustomed to any impacts from converter station - e.g. as they have undergone training before the converter station is operational.	Human Factors	Extremely Improbable
CF08	Air-ground communications impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Remote
Consequences			
ID	**Description**	**Severity**	
C01	Aircraft unintentionally deviates from normal in-flight parameters.	Significant Incident	
C04	Aircraft does not accelerate or take off as expected.	No Immediate Effect	
C07	Aircraft in close proximity with another aircraft such that their safety is or may be compromised.	Significant Incident	
C14	Runway overrun	No Immediate Effect	
Probability		**Severity**	
Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.	Open	NG
M02	The design of all road lighting to be compliant with BS 5489 [6] Section 12.2: Lighting in the vicinity of aerodromes.	Closed	NG
M03	External surfaces of building to be designed not to present a distraction to aircrew.	Open	NG
M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.	Open	RCAM

M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).	Closed	FBC
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M35	All electrical systems to be designed to ensure radio frequency (RF) levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			
LSA RFI assessment showed that emissions are below the levels at which interference would occur, and the probability of interference to radios is very low for current airfield operations. There is no credible risk of equipment damage.			

A.2 HAZ02

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-17	
Description			
Wind impact.			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF21	Heat generated from converter station - air density changes immediately above the facility impacts aircraft or gliders.	Technical Factors	Extremely Improbable
CF24	Wind impact, caused by building or landscaping (turbulence and unexpected changes in wind patterns, wind shear, and so on).	Environmental Factors	Extremely Improbable
CF32	Tall trees	Environmental Factors	Remote
Consequences			
ID	**Description**	**Severity**	
C01	Aircraft unintentionally deviates from normal in-flight parameters.	Significant Incident	
C02	Inability to make a stop within the expected distance requirements.	Significant Incident	
C03	Loss of directional control on the runway.	Significant Incident	
C05	Terrain separation deteriorating below normal requirements	Significant Incident	
Probability		**Severity**	
Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M06	Wind assessment to determine the impact of the building on the wind patterns (including consideration of light aircraft and UAVs).	Closed	NG
M07	Publicity and training to include awareness of possible wind effects.	Open	RCAM
M09	Effects of wind to be kept under review in case of increased traffic	Closed	FBC
M10	Airmanship provides mitigation.	Closed	
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M42	The possible effects of heat from the facility on UAVs are to be reviewed,	Closed	RCAM
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			

Date of Action	
Status of this Hazard Log Entry	**Date Closed**
Open	
Comment	
Note that no direct impact of the IFA2 on the landing has been identified. This hazard is related to wind phenomenon.	

A.3 HAZ03

Identified By		**Date Created**	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-17	
Description			
Bird strike			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF29	Future planning of landscaping - attracts birds near to airfield	Environmental Factors	Remote
CF30	Converter station warms air immediately above the converter station and attracts birds.	Environmental Factors	Remote
CF31	Building design - flat roof - attracts birds	Environmental Factors	Remote
Consequences			
ID	**Description**	**Severity**	
C01	Aircraft unintentionally deviates from normal in-flight parameters.	Significant Incident	
Probability		**Severity**	
Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M12	Building to provide appropriate access for bird management strategy.	Open	NG
M14	RCAM to discuss bird strikes with a wildlife expert and to seek the expert's advice on how to manage the bird activities in this area.	Closed	RCAM
M15	FBC to consider the risk of bird strike in future landscaping and choice of trees, and so on.	Closed	FBC
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			

A.4 HAZ04

Identified By		**Date Created**	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Closed		12-Apr-17	
Description			
Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF21	Heat generated from converter station - air density changes immediately above the facility impacts aircraft or gliders.	Technical Factors	Extremely Improbable
CF24	Wind impact, caused by building or landscaping (turbulence and unexpected changes in wind patterns, wind shear, and so on).	Environmental Factors	Extremely Improbable
Consequences			
ID	**Description**	**Severity**	
C02	Inability to make a stop within the expected distance requirements.	Significant Incident	
Probability		**Severity**	
Extremely Improbable		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M06	Wind assessment to determine the impact of the building on the wind patterns (including consideration of light aircraft and UAVs).	Closed	NG
M07	Publicity and training to include awareness of possible wind effects.	Open	RCAM
M09	Effects of wind to be kept under review in case of increased traffic	Closed	FBC
M10	Airmanship provides mitigation.	Closed	
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M42	The possible effects of heat from the facility on UAVs is to be reviewed,	Closed	RCAM
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Hazard merged with HAZ02			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	

Closed 24-Apr-17	
Comment	

A.5 HAZ05

Identified By		**Date Created**	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-17	
Description			
Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF21	Heat generated from converter station - air density changes immediately above the facility impacts aircraft or gliders.	Technical Factors	Extremely Improbable
CF24	Wind impact, caused by building or landscaping (turbulence and unexpected changes in wind patterns, wind shear, and so on).	Environmental Factors	Extremely Improbable
Consequences			
ID	**Description**	**Severity**	
C03	Loss of directional control on the runway.	Significant Incident	
Probability		**Severity**	
Extremely Improbable		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M06	Wind assessment to determine the impact of the building on the wind patterns (including consideration of light aircraft and UAVs).	Closed	NG
M07	Publicity and training to include awareness of possible wind effects.	Open	RCAM
M09	Effects of wind to be kept under review in case of increased traffic	Closed	FBC
M10	Airmanship provides mitigation.	Closed	
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M42	The possible effects of heat from the facility on UAVs are to be reviewed.	Open	RCAM
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Merged with HAZ02			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Closed		24-Apr-17	

Comment

A.6 HAZ06

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Revised based on second FHA meeting.	12-Apr-17

Description

Distraction of aircrew or control tower staff.

Causal Factors

ID	Description	Category	Likelihood
CF01	Distraction of aircrew at night caused by lighting from the facility - building and security lighting	Human Factors	Extremely Improbable
CF02	Distraction of aircrew at night caused by reflection from building structure and cladding	Human Factors	Extremely Improbable
CF04	Communication interference, impacting the workload of the staff in control tower or aircrew (e.g. dealing with instrumentation and radio problems).	Human Factors	Extremely Improbable
CF05	Noise from IFA2 facility causes a distraction.	Human Factors	Extremely Improbable
CF06	Pilots under training who are not accustomed to any impacts from converter station - e.g. as they have undergone training before the converter station is operational.	Human Factors	Extremely Improbable
CF08	Air-ground communications impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Remote

Consequences

ID	Description	Severity
C04	Aircraft does not accelerate or take off as expected.	No Immediate Effect

Probability	Severity
Remote	No Immediate Effect

Controls, Mitigations and Actions

ID	Description	Status	Assigned
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.	Open	NG
M02	The design of all road lighting to be compliant with BS 5489 [6] Section 12.2: Lighting in the vicinity of aerodromes.	Open	NG
M03	External surfaces of building to be designed not to present a distraction to aircrew.	Open	NG
M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.	Open	RCAM
M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).	Closed	FBC

M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG

Proposed By	**Planned Date**
HIRA 24-8-16	

Action taken
Merged with HAZ01

Date of Action
24-Apr-17

Status of this Hazard Log Entry	**Date Closed**
Closed	24-Apr-17

Comment

A.7 HAZ07

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Closed 24-Apr-17	

Description

Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.

Causal Factors

ID	Description	Category	Likelihood
CF21	Heat generated from converter station - air density changes immediately above the facility impacts aircraft or gliders.	Technical Factors	Extremely Improbable
CF24	Wind impact, caused by building or landscaping (turbulence and unexpected changes in wind patterns, wind shear, and so on).	Environmental Factors	Extremely Improbable

Consequences

ID	Description	Severity
C05	Terrain separation deteriorating below normal requirements	Significant Incident

Probability	Severity
Extremely Improbable	Significant Incident

Controls, Mitigations and Actions

ID	Description	Status	Assigned
M06	Wind assessment to determine the impact of the building on the wind patterns (including consideration of light aircraft and UAVs).	Closed	NG
M07	Publicity and training to include awareness of possible wind effects.	Open	RCAM
M09	Effects of wind to be kept under review in case of increased traffic	Closed	FBC
M10	Airmanship provides mitigation.	Closed	
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M42	The possible effects of heat from the facility on UAVs is to be reviewed.	Closed	RCAM

Proposed By	Planned Date
HIRA 24-8-16	

Action taken

Merged with HAZ02

Date of Action

24-Apr-17

Status of this Hazard Log Entry	Date Closed

Closed	24-Apr-17
Comment	

A.8 HAZ08

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Closed		12-Apr-17	
Description			
Distraction of aircrew or control tower staff.			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF01	Distraction of aircrew at night caused by lighting from the facility - building and security lighting	Human Factors	Extremely Improbable
CF02	Distraction of aircrew at night caused by reflection from building structure and cladding	Human Factors	Extremely Improbable
CF04	Communication interference, impacting the workload of the staff in control tower or aircrew (e.g. dealing with instrumentation and radio problems).	Human Factors	Extremely Improbable
CF05	Noise from IFA2 facility causes a distraction.	Human Factors	Extremely Improbable
CF06	Pilots under training who are not accustomed to any impacts from converter station - e.g. as they have undergone training before the converter station is operational.	Human Factors	Extremely Improbable
CF08	Air-ground communications impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Remote
Consequences			
ID	**Description**	**Severity**	
C05	Terrain separation deteriorating below normal requirements	Significant Incident	
Probability		**Severity**	
Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.	Open	NG
M02	The design of all road lighting to be compliant with BS 5489 [6] Section 12.2: Lighting in the vicinity of aerodromes.	Open	NG
M03	External surfaces of building to be designed not to present a distraction to aircrew.	Open	NG
M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.	Open	RCAM
M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).	Closed	FBC

M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Merged with HAZ01			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Closed		24-Apr-17	
Comment			

A.9 HAZ09

Intentionally blank.

A.10 HAZ10

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Revised based on second FHA meeting.	12-Apr-17

Description

Distraction of control tower staff.

Causal Factors

ID	Description	Category	Likelihood
CF01	Distraction of aircrew at night caused by lighting from the facility - building and security lighting	Human Factors	Extremely Improbable
CF02	Distraction of aircrew at night caused by reflection from building structure and cladding	Human Factors	Extremely Improbable
CF04	Communication interference, impacting the workload of the staff in control tower or aircrew (e.g. dealing with instrumentation and radio problems).		
CF05	Noise from IFA2 facility causes a distraction.	Human Factors	Extremely Improbable
CF06	Pilots under training who are not accustomed to any impacts from converter station - e.g. as they have undergone training before the converter station is operational.	Human Factors	Extremely Improbable
CF08	Air-ground communications impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Remote

Consequences

ID	Description	Severity
C06	Incorrect presence of aircraft, people, or vehicles in the protected area.	Significant Incident
C07	Aircraft in close proximity with another aircraft such that their safety is or may be compromised.	Significant Incident
C14	Runway overrun	No Immediate Effect

Probability	Severity
Remote	Significant Incident

Controls, Mitigations and Actions

ID	Description	Status	Assigned
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.	Open	NG
M02	The design of all road lighting to be compliant with BS 5489 [6] 12.2: Lighting in the vicinity of aerodromes. Section	Open	NG
M03	External surfaces of building to be designed not to present a distraction to aircrew.	Open	NG
M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.	Open	RCAM

M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).	Closed	FBC
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			

A.11 HAZ11

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-17	
Description			
Impaired ground to ground communications.			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF09	Ground-ground communications (UHF) impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Extremely Improbable
CF10	Interference caused by emissions from HV cables/facility delays Emergency Services communication	Technical Factors	Extremely Improbable
Consequences			
ID	**Description**	**Severity**	
C09	Delay to emergency services response	No Immediate Effect	
C06	Incorrect presence of aircraft, people, or vehicles in the protected area.	Significant Incident	
Probability		**Severity**	
Extremely Improbable		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M24	FIS procedures to take into account the possibility of impairment to ground- ground communications.	Open	RCAM
M34	Lighting signals can be used if RF levels are exceptionally sufficiently high to cause interruption to radio communications systems	Open	RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			

A.12 HAZ12

Identified By		**Date Created**	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Closed			
Description			
Impaired ground to ground communications.			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF09	Ground-ground communications (UHF) impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Extremely Improbable
Consequences			
ID	**Description**	**Severity**	
C06	Incorrect presence of aircraft, people, or vehicles in the protected area.	Significant Incident	
Probability		**Severity**	
Extremely Improbable		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M34	Lighting signals can be used if RF levels are exceptionally sufficiently high to cause interruption to radio communications systems	Open	RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Merged with HAZ11			
Date of Action			
12-Apr-17			
Status of this Hazard Log Entry		**Date Closed**	
Closed		24-Apr-17	
Comment			

A.13 HAZ13

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Closed		12-Apr-17	
Description			
Distraction of aircrew or control tower staff (class G airspace operations)			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF01	Distraction of aircrew at night caused by lighting from the facility - building and security lighting	Human Factors	Extremely Improbable
CF02	Distraction of aircrew at night caused by reflection from building structure and cladding	Human Factors	Extremely Improbable
CF04	Communication interference, impacting the workload of the staff in control tower or aircrew (e.g. dealing with instrumentation and radio problems).	Human Factors	Extremely Improbable
CF05	Noise from IFA2 facility causes a distraction.	Human Factors	Extremely Improbable
CF06	Pilots under training who are not accustomed to any impacts from converter station - e.g. as they have undergone training before the converter station is operational.	Human Factors	Extremely Improbable
CF08	Air-ground communications impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Remote
Consequences			
ID	**Description**	**Severity**	
C07	Aircraft in close proximity with another aircraft such that their safety is or may be compromised.	Significant Incident	
Probability		**Severity**	
Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.	Open	NG
M02	The design of all road lighting to be compliant with BS 5489 [6] Section12.2: Lighting in the vicinity of aerodromes.	Open	NG
M03	External surfaces of building to be designed not to present a distraction to aircrew.	Open	NG
M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.	Open	RCAM
M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).	Closed	FBC

M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Merged with HAZ01			
Date of Action			
24-Apr-17			
Status of this Hazard Log Entry		**Date Closed**	
Closed		24-Apr-17	
Comment			

A.14 HAZ14

Identified By		**Date Created**	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Closed		12-Apr-17	
Description			
Distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations)			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF02	Distraction of aircrew at night caused by reflection from building structure and cladding	Human Factors	Extremely Improbable
Consequences			
ID	**Description**	**Severity**	
C07	Aircraft in close proximity with another aircraft such that their safety is or may be compromised.	Significant Incident	
Probability		**Severity**	
Extremely Improbable		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M03	External surfaces of building to be designed not to present a distraction to aircrew.	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Merged with HAZ01			
Date of Action			
12-Apr-17			
Status of this Hazard Log Entry		**Date Closed**	
Closed		24-Apr-17	
Comment			

A.15 HAZ15

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Closed	12-Apr-2017

Description

Distraction of aircrew or control tower staff, other than by distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations)

Causal Factors

ID	Description	Category	Likelihood
CF01	Distraction of aircrew at night caused by lighting from the facility - building and security lighting	Human Factors	Extremely Improbable
CF04	Communication interference, impacting the workload of the staff in control tower or aircrew (e.g. dealing with instrumentation and radio problems).	Human Factors	Extremely Improbable
CF05	Noise from IFA2 facility causes a distraction.	Human Factors	Extremely Improbable
CF06	Pilots under training who are not accustomed to any impacts from converter station - e.g. as they have undergone training before the converter station is operational.	Human Factors	Extremely Improbable
CF08	Air-ground communications impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Remote

Consequences

ID	Description	Severity
C07	Aircraft in close proximity with another aircraft such that their safety is or may be compromised.	Significant Incident

Probability	Severity
Remote	Significant Incident

Controls, Mitigations and Actions

ID	Description	Status	Assigned
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.	Open	NG
M02	The design of all road lighting to be compliant with BS 5489 [6] Section12.2: Lighting in the vicinity of aerodromes.	Open	NG
M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.	Open	RCAM
M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).	Closed	FBC

M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Merged with hazards HAZ01 and HAZ10			
Date of Action			
12-Apr-17			
Status of this Hazard Log Entry		**Date Closed**	
Closed		24-Apr-17	
Comment			

A.16 HAZ16

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Closed		24-Apr-17	
Description			
Distraction of aircrew or control tower staff			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF01	Distraction of aircrew at night caused by lighting from the facility - building and security lighting	Human Factors	Extremely Improbable
CF02	Distraction of aircrew at night caused by reflection from building structure and cladding	Human Factors	Extremely Improbable
CF04	Communication interference, impacting the workload of the staff in control tower or aircrew (e.g. dealing with instrumentation and radio problems).	Human Factors	Extremely Improbable
CF05	Noise from IFA2 facility causes a distraction.	Human Factors	Extremely Improbable
CF06	Pilots under training who are not accustomed to any impacts from converter station - e.g. as they have undergone training before the converter station is operational.	Human Factors	Extremely Improbable
CF08	Air-ground communications impacted by interference caused by emissions from HV cables/facility.	Technical Factors	Remote
Consequences			
ID	**Description**	**Severity**	
C14	Runway overrun	No Immediate Effect	
Probability		**Severity**	
Remote		No Immediate Effect	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.	Open	NG
M02	The design of all road lighting to be compliant with BS 5489 [6] Section12.2: Lighting in the vicinity of aerodromes.	Open	NG
M03	External surfaces of building to be designed not to present a distraction to aircrew.	Open	NG

M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.	Open	RCAM
M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).	Closed	FBC
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Merged with HAZ01 and HAZ10			
Date of Action			
24-Apr-17			
Status of this Hazard Log Entry		**Date Closed**	
Closed		24-Apr-17	
Comment			

A.17 HAZ17

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-17	
Description			
Terrorist attack on IFA2			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF36	Terrorist attack on IFA2	Terrorist Incident	
Consequences			
ID	**Description**	**Severity**	
C01	Aircraft unintentionally deviates from normal in-flight parameters.	Significant Incident	
Probability		**Severity**	
Significant		Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M37	A threat assessment to be conducted to determine the threat levels, using input from NG and FBC.	Open	RCAM
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action Taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			

A.18 HAZ18

Identified By		**Date Created**	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-17	
Description			
Exposure of public and workers to excessive magnetic fields			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF03	Human (public and workers) exposure to excessive magnetic fields (see 8.2 for impact on equipment)	Human Factors	Extremely Improbable
Consequences			
ID	**Description**	**Severity**	
C08	Harm to health	Significant Incident	
Probability		**Severity**	
Extremely Improbable		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M38	Project documentation to show that alternating current (AC) and direct current (DC) fields comply with requirements.	Open	NG
M41	This risk of public exposure to electromagnetic fields is eliminated provided the planning constraint for emissions is met.	Closed	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			
This hazard is to be designed out. The current limit required by planning constraints is ~10µT which is significantly lower than the maximum limit specified by the regulations (~100µT for public and 500µT for workers).			

A.19 HAZ19

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-17	
Description			
Incorrect magnetic compass reading			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF07	Magnetic compass/magnetometer deviation caused by magnetic fields from HV cables.	Technical Factors	Remote
Consequences			
ID	**Description**	**Severity**	
C05	Terrain separation deteriorating below normal requirements	Significant Incident	
Probability		**Severity**	
Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M10	Airmanship provides mitigation.	Closed	
M19	RCAM, in collaboration with NG, to confirm that the magnetic fields at the compass base could not credibly lead to incorrect calibration of magnetic compasses.	Open	RCAM, NG
M20	Pre-flight check area to be assessed for effect of magnetic fields on the setting of aircraft direction indicators.	Open	RCAM
M21	RCAM to promulgate instruction to calibrate magnetic compasses only at compass base.	Open	RCAM
M22	General airmanship provides a mitigation because aircrew should quickly identify incorrect calibration by reference to visual landmarks.	Closed	
M23	RCAM to promulgate instruction not to set direction indicators against magnetic compasses in zones likely to be subject to magnetic interference.	Open	RCAM
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Date of Action			

Status of this Hazard Log Entry	Date Closed
Open	
Comment	

A.20 HAZ20

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		12-Apr-2017	
Description			
High 50Hz impressed voltage or touch potentials due to fences or LV cabling.			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF19	Touch potential from HV cable layout or impressed potential in fences (planned or existing) and existing LV cables with the risk of impressed voltages.	Technical Factors	
Consequences			
ID	**Description**	**Severity**	
C11	Electric shock / electrocution	Serious Incident	
Probability		**Severity**	
		Serious Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M30	Detailed surveys for existing services are to be undertaken before excavation of a trench to lay the cables. Any existing cables will either be revealed by the survey or exposed on excavation and moved/dealt with appropriately. Thus, subject to this being completed, the risk of electric shock from impressed voltage and touch potentials will be eliminated by design.	Open	NG
M43	Cable protection system to ensure power is promptly removed in the event of an insulation failure.	Open	NG
M45	If any high-power AC cables run parallel or near-parallel to any metal fences or similar structures and run alongside for a significant distance, those structures are to be sufficiently earthed, and that earthing maintained sufficiently, to eliminate the risk of dangerous impressed and touch potentials.	Open	
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	

Open	
Comment	

A.21 HAZ21

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Revised based on second FHA meeting.	12-Apr-17

Description

Loss of control of UAV.

Causal Factors

ID	Description	Category	Likelihood
CF20	Emissions/RFI from HV cables/facility cause malfunctioning of UAV (e.g. drones).	Technical Factors	Remote
CF21	Heat generated from converter station - air density changes immediately above the facility impacts aircraft or gliders.	Technical Factors	Extremely Improbable

Consequences

ID	Description	Severity
C07	Aircraft in close proximity with another aircraft such that their safety is or may be compromised.	Significant Incident

Probability	Severity
Remote	Significant Incident

Controls, Mitigations and Actions

ID	Description	Status	Assigned
M07	Publicity and training to include awareness of possible wind effects.	Open	RCAM
M10	Airmanship provides mitigation.	Closed	
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open	RCAM
M31	The communication strategy in place for flying UAVs to be studied further to determine possible risk.	Open	RCAM, FBC
M39	NG to Review RFI impact on UAVs.	Open	NG
M42	The possible effects of heat from the facility on UAVs are to be reviewed.	Closed	RCAM

Proposed By	Planned Date
HIRA 24-8-16	

Action taken

Date of Action

Status of this Hazard Log Entry	Date Closed
Open	

Comment

A.22 HAZ22

Identified By		Date Created	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Revised based on second FHA meeting.		22-Apr-17	
Description			
Smoke impeding vision of aircrew.			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF23	Equipment within the converter station catches fire and generates smoke impeding vision of aircrew	Fire and Smoke	Extremely Remote
Consequences			
ID	**Description**	**Severity**	
C05	Terrain separation deteriorating below normal requirements	Significant Incident	
C07	Aircraft in close proximity with another aircraft such that their safety is or may be compromised.	Significant Incident	
Probability		**Severity**	
Extremely Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M32	Design specifications to require fire protection systems to ensure that fire is controllable.	Open	NG
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action Taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			
The risk is unlikely to be significantly worse than any other building near the airport because advanced fire management systems such as the proposed fire deluge system are expected to offset any increased fire risk due to the location of the IFA2 and the materials present.			

A.23 HAZ23

Identified By		**Date Created**	
HIRA 24-8-16		24-Aug-16	
Last Update Action		**Date of Last Update**	
Closed.		22-Apr-17	
Description			
Smoke impeding vision of aircrew			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF23	Equipment within the converter station catches fire and generates smoke impeding vision of aircrew	Fire and Smoke	Extremely Remote
Consequences			
ID	**Description**	**Severity**	
C07	Aircraft in close proximity with another aircraft such that their safety is or may be compromised.	Significant Incident	
Probability		**Severity**	
Extremely Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M32	Design specifications to require fire protection systems to ensure that fire is controllable. Open	NG	
Proposed By		**Planned Date**	
HIRA 24-8-16			
Action Taken			
Merged with HAZ22			
Date of Action			
24-Apr-17			
Status of this Hazard Log Entry		**Date Closed**	
Closed		24-Apr-17	
Comment			
The risk is unlikely to be significantly worse than any other building near the airport because advanced fire management systems such as the proposed fire deluge system are expected to offset any increased fire risk due to the location of the IFA2 and the materials present.			

A.24 HAZ24

Identified By		**Date Created**	
HIRA 12-4-17		12-Apr-17	
Last Update Action		**Date of Last Update**	
Created		12-Apr-17	
Description			
Incorrect ground lighting intensity			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF26	Interference from high-voltage cables affects ground lighting.	Technical Factors	Remote
Consequences			
ID	**Description**	**Severity**	
C01	Aircraft unintentionally deviates from normal in-flight parameters.	Significant Incident	
Probability		**Severity**	
Remote		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M40	Any future Airfield Ground Lighting (AGL) system to be designed to ensure interference from HV cables cannot credibly affect the lighting.	Open	RCAM
Proposed By		**Planned Date**	
HIRA 12-4-17			
Action Taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			
There is no AGL system at the airport. This hazard relates to possible future development.			

A.25 HAZ25

Identified By		**Date Created**	
HIRA 12-4-17		12-Apr-17	
Last Update Action		**Date of Last Update**	
Created		12-Apr-17	
Description			
Wrong or no altimeter reading			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF11	Altimeters (UHF) impacted by emissions from HV cables/facility.	Technical Factors	Extremely Improbable
Consequences			
ID	**Description**	**Severity**	
C05	Terrain separation deteriorating below normal requirements	Significant Incident	
Probability		**Severity**	
Extremely Improbable		Significant Incident	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M25	If aircraft using radio altimetry are likely to use the airport, the effect of the IFA2 on radio altimetry is to be assessed.	Open	RCAM
Proposed By		**Planned Date**	
HIRA 12-4-17			
Action Taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment For MCA Equipment altimetry is part of the flight management / terrain awareness system which uses a GPS interface (no ground based systems). Pilots are particularly reliant on this equipment during bad-weather approaches. Impact to be assessed to ensure the likelihood of the hazard is extremely improbable.			

A.26 HAZ26

Identified By		**Date Created**	
HIRA 12-4-17		12-Apr-17	
Last Update Action		**Date of Last Update**	
Reviewed and updated following meeting with MCA on 25 July 2017.		23-Aug-17	
Description			
Unknown effect on MCA operations			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF15	Interference with Maritime Coastguard Agency communications caused by RFI /emissions from/HV cables/facility.	Technical Factors	
CF25	Emissions from HV cables/facility interfere with meteorological instruments.	Technical Factors	
Consequences			
ID	**Description**	**Severity**	
C12	Unknown effect on MCA		
Probability		**Severity**	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M27	Liaise with MCA to identify possible hazards specific to its operation arising from IFA2.	Closed	FBC, RCAM
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 12-4-17			
Action taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			
Merged with HAZ01, HAZ06, HAZ08, HAZ10, HAZ13, HAZ15, and HAZ16 after discussion with MCA.			

A.27 HAZ27

Identified By		Date Created	
HIRA 12-4-17		12-Apr-17	
Last Update Action		**Date of Last Update**	
Created		12-Apr-17	
Description			
Unknown effects on Britten-Norman operations			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF16	Emissions from HV cables and facilities impacts Britten-Norman activities involving complex avionics and military aircraft.	Technical Factors	
Consequences			
ID	**Description**	**Severity**	
C10	Unknown effect on Britten-Norman operations		
Probability		**Severity**	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M28	Liaise with Britten-Norman to identify possible hazards specific to its operation arising from IFA2.	Closed	RCAM, FBC
Proposed By		**Planned Date**	
HIRA 12-4-17			
Action Taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			

A.28 HAZ28

Identified By		Date Created	
HIRA 12-4-17		12-Apr-17	
Last Update Action		**Date of Last Update**	
Created		12-Apr-17	
Description			
Unknown effect of NATS operations			
Causal Factors			
ID	**Description**	**Category**	**Likelihood**
CF17	Impact on Radar due to emissions from HV cables/facility	Technical Factors	
Consequences			
ID	**Description**	**Severity**	
C13	Unknown effect on NATS		
Probability		**Severity**	
Controls, Mitigations and Actions			
ID	**Description**	**Status**	**Assigned**
M29	Liaise with NATS to identify possible hazards specific to its operation arising from IFA2.	Closed	RCAM, FBC
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference	Open	NG
Proposed By		**Planned Date**	
HIRA 12-4-17			
Action taken			
Date of Action			
Status of this Hazard Log Entry		**Date Closed**	
Open			
Comment			

APPENDIX B CAUSAL FACTOR FORMS

B.1 CF01

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description

Distraction of aircrew at night caused by lighting from the facility - building and security lighting

Category

Human Factors

Consequence

Temporary reduction in vision caused by glare

Probability

Extremely Improbable

Controls, Mitigations and Actions

ID	Mitigation
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.
M02	The design of all road lighting to be compliant with BS 5489 [6] Section 12.2: Lighting in the vicinity of aerodromes.

Associated Hazards

ID	Description
HAZ01	Distraction of aircrew.
HAZ06	Distraction of aircrew or control tower staff.
HAZ08	Distraction of aircrew or control tower staff.
HAZ10	Distraction of control tower staff.
HAZ13	Distraction of aircrew or control tower staff (class G airspace operations).
HAZ15	Distraction of aircrew or control tower staff, other than by distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations).
HAZ16	Distraction of aircrew or control tower staff.

Comments

B.2 CF02

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description

Distraction of aircrew at night caused by reflection from building structure and cladding

Category

Human Factors

Consequence

Temporary reduction in vision caused by glare

Probability

Extremely Improbable

Controls, Mitigations and Actions

ID	Mitigation
M03	External surfaces of building to be designed not to present a distraction to aircrew.

Associated Hazards

ID	Description
HAZ01	Distraction of aircrew.
HAZ06	Distraction of aircrew or control tower staff.
HAZ08	Distraction of aircrew or control tower staff.
HAZ10	Distraction of control tower staff.
HAZ13	Distraction of aircrew or control tower staff (class G airspace operations).
HAZ14	Distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations).
HAZ16	Distraction of aircrew or control tower staff.

Comments

B.3 CF03

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description
Human (public and workers) exposure to excessive magnetic fields (see 8.2 for impact on equipment)
Category
Human Factors
Consequence
Health hazard.
Probability
Extremely Improbable
Controls, Mitigations and Actions

ID	**Mitigation**
M38	Project documentation to show that AC and direct current (DC) fields comply with requirements.
M41	This risk of public exposure to electromagnetic fields is eliminated provided the planning constraint for emissions is met.

Associated Hazards

ID	**Description**
HAZ18	Exposure of public and workers to excessive magnetic fields

Comments
No specific effect at the airport, relative to the general background magnetic fields.

B.4 CF04

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description
Communication interference, impacting the workload of the staff in control tower or aircrew (e.g. dealing with instrumentation and radio problems).
Category
Human Factors
Consequence
Interference impacts radio or causes damage to communication or navigation equipment. Increased workload dealing with this causes distraction of tower personnel or aircrew.
Probability
Extremely Improbable
Controls, Mitigations and Actions

ID	Mitigation
M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.

Associated Hazards

ID	Description
HAZ01	Distraction of aircrew.
HAZ06	Distraction of aircrew or control tower staff.
HAZ08	Distraction of aircrew or control tower staff.
HAZ10	Distraction of control tower staff.
HAZ13	Distraction of aircrew or control tower staff (class G airspace operations).
HAZ15	Distraction of aircrew or control tower staff, other than by distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations).
HAZ16	Distraction of aircrew or control tower staff.

Comments
There may be a localised impact on communication, but this can be identified and managed.
The likelihood and significance could increase with the introduction of new equipment (such as visiometers and cloud base recorders) and introduction of FIS, but the second HIRA 24-8-16 did not consider such changes would be sufficient to change the risk categories of the associated hazards.

If communications fail during the final phase of approach, it is extremely unlikely that the aircrew would be sufficiently distracted by the failure to affect their handling of the landing.

B.5 CF05

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description
Noise from IFA2 facility causes a distraction.
Category
Human Factors
Consequence
Distraction to aircrew due to noise from the facility.
Probability
Extremely Improbable
Controls, Mitigations and Actions

ID	**Mitigation**
M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).
Associated Hazards	
ID	**Description**
HAZ01	Distraction of aircrew.
HAZ06	Distraction of aircrew or control tower staff.
HAZ08	Distraction of aircrew or control tower staff.
HAZ10	Distraction of control tower staff.
HAZ13	Distraction of aircrew or control tower staff (class G airspace operations).
HAZ15	Distraction of aircrew or control tower staff, other than by distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations).
HAZ16	Distraction of aircrew or control tower staff.

Comments
Noise levels from the IFA2 facility are low. Unlikely to be heard by aircraft, possibly could be heard by glider pilots. Noise levels unlikely to be higher than the background noise. To be considered as part of the design specifications.

B.6 CF06

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description
Pilots under training who are not accustomed to any impacts from converter station - e.g. as they have undergone training before the converter station is operational.

Category
Human Factors

Consequence
Distraction to aircrew

Probability
Extremely Improbable

Controls, Mitigations and Actions

ID	Mitigation
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.

Associated Hazards

ID	Description
HAZ01	Distraction of aircrew.
HAZ06	Distraction of aircrew or control tower staff.
HAZ08	Distraction of aircrew or control tower staff.
HAZ10	Distraction of control tower staff.
HAZ13	Distraction of aircrew or control tower staff (class G airspace operations).
HAZ15	Distraction of aircrew or control tower staff, other than by distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations).
HAZ16	Distraction of aircrew or control tower staff.

Comments
For Pilots under training, the onus is on the instructor. It is expected to take 4 years to build the facility, with plenty of publicity, so trainees have time to adjust. Communications required on switching on of the facility.

B.7 CF07

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Magnetic compass/magnetometer deviation caused by magnetic fields from HV cables.	
Category	
Technical Factors	
Consequence	
Wrong compass reading or heading indication.	
Probability	
Remote	
Controls, Mitigations and Actions	

ID	**Mitigation**
M10	Airmanship provides mitigation.
M19	RCAM, in collaboration with NG, to confirm that the magnetic fields at the compass base could not credibly lead to incorrect calibration of magnetic compasses.
M20	Pre-flight check area to be assessed for effect of magnetic fields on the setting of aircraft direction indicators.
M21	RCAM to promulgate instruction to calibrate magnetic compasses only at compass base.
M22	General airmanship provides a mitigation because aircrew should quickly identify incorrect calibration by reference to visual landmarks.
M23	RCAM to promulgate instruction not to set direction indicators against magnetic compasses in zones likely to be subject to magnetic interference.

Associated Hazards	
ID	**Description**
HAZ19	Incorrect magnetic compass reading.

Comments
More information was available at the second HIRA 24-8-16 than at the first HIRA 24-8-16.
HAZ19 has been expanded to cover all magnetic compass deviation caused by fields from HV cables
LSA RFI assessment demonstrated only a localised impact on magnetic fields for compass and magnetometers on the ground in certain locations.
Provided the compass is calibrated correctly, reading will revert to correct reading once outside the zone.

The compass base is an area allocated for compass calibration, away from the cable routes. The distance between the compass base and the cable routes should reduce the probability of IFA2 affecting compass calibration to Remote or better.
Within the pre-flight checks, the compass will be used to set direction indicators, which introduces a potential risk because the area might be close to the cables.
Magnetic checks shall be conducted after the cables are installed under the ground to identify whether it will be a suitable area for pre-flight checks including compass calibration.
It is anticipated that in the worst case, there may belocalised deflection within ±12m of the cables.
Compass checks shall not take place in the vicinity of the cables.
The direction indicator is not directly affected by EMI. The direction indicator should be reset in flight every 10-15min by the aircrew, which should correct any incorrect Direction Indicator (DI) setting.
Multiple failures would be needed for this hazard to be realised: • The aircrew conducts the pre-flight checks in a location in which the magnetic compass is misaligned; • The aircrew fails to notice that the DI does not align with the runway direction; • The aircrew fails to reset the DI as required by normal procedures; • The aircrew fails to notice (by reference to ground features) that the aircraft is deviating from the intended course.

B.8 CF08

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Air-ground communications impacted by interference caused by emissions from HV cables/facility.	
Category	
Technical Factors	
Consequence	
Delayed air-ground communication.	
Probability	
Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference.
Associated Hazards	
ID	**Description**
HAZ01	Distraction of aircrew.
HAZ06	Distraction of aircrew or control tower staff.
HAZ08	Distraction of aircrew or control tower staff.
HAZ10	Distraction of control tower staff.
HAZ13	Distraction of aircrew or control tower staff (class G airspace operations).
HAZ15	Distraction of aircrew or control tower staff, other than by distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations).
HAZ16	Distraction of aircrew or control tower staff.
Comments	
LSA RFI assessment concludes low probability of interference for current operations.	
Risk of interference for additional equipment introduced for future operations would be assessed as part of the safety management of the introduction of that equipment.	
With the introduction of an FIS, there is the potential for safety impact in the event of interference/disruption in air - ground communications.	
In events when main radio communication is lost FISO will make a decision to change radio and communicate with the	

pilot. Furthermore, Air traffic control may use light signals to communicate with the pilots.

B.9 CF09

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description
Ground-ground communications (UHF) impacted by interference caused by emissions from HV cables/facility.
Category
Technical Factors
Consequence
None
Probability
Extremely Improbable
Controls, Mitigations and Actions

ID	**Mitigation**
M34	Lighting signals can be used if RF levels are exceptionally sufficiently high to cause interruption to radio communications systems.
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference.

Associated Hazards	
ID	**Description**
HAZ11	Impaired ground to ground communications.
HAZ12	Impaired ground to ground communications.

Comments
No mechanism has been Identified By which ground-ground communication problems can impair the safety of operations.
No mechanism has been Identified By which ground-ground communication problems can impair the safety of operations.
Equipment introduced for future operations will be subject to its own risk management.
Trained staff stop at a safe place when the communication fails. If main radio communication is lost FISO can make a decision to change radio and communicate with the pilot or can use light signals to communicate with the pilots/ people on the ground/ vehicles on the ground.
Trained staff stop at a safe place when the communication fails. If main radio communication is lost FISO can make a decision to change radio and communicate with the pilot or can use light signals to communicate with the pilots/ people on the ground/ vehicles on the ground.

B.10 CF10

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Interference caused by emissions from HV cables/facility delays Emergency Services communication	
Category	
Technical Factors	
Consequence	
Delay in response from Emergency Services	
Probability	
Extremely Improbable	
Controls, Mitigations and Actions	
ID	**Mitigation**
M24	FIS procedures to take into account the possibility of impairment of ground-ground communications.
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference
Associated Hazards	
ID	**Description**
HAZ11	Impaired ground to ground communications.
Comments	
Amended for the introduction of an FIS.	
Equipment introduced for future operations will be subject to its own risk management.	
Emergency services have agreed response procedures with fire zones defined.	
In the event of a fire/emergency, all air traffic would be directed to an alternative airport until it is safe to land.	
Several communication channels as options under FISO. Emergency communications prioritised (radio silence). If necessary, emergency services can be directed to the incident by other means.	

B.11 CF11

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Altimeters (UHF) impacted by emissions from HV cables/facility.	
Category	
Technical Factors	
Consequence	
Wrong or no altimeter reading	
Probability	
Extremely Improbable	
Controls, Mitigations and Actions	
ID	**Mitigation**
M25	If aircraft using radio altimetry are likely to use the airport, the effect of the IFA2 on radio altimetry is to be assessed.
Associated Hazards	
ID	**Description**
HAZ25	Wrong or no altimeter reading
Comments	

B.12 CF12

Identified By	**Date Created**
HIRA 24-8-16.	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Instrument Landing System (ILS) impacted by emissions from HV cables/facility	
Category	
Technical Factors	
Consequence	
Incorrect ILS guidance.	
Probability	
Controls, Mitigations and Actions	
Associated Hazards	
Comments	
No ILS currently.	
Confirmed as no longer applicable.	

B.13 CF13

Identified By	**Date Created**
HIRA 24-8-16.	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
GPS impacted by emissions from HV cables/facility (note current aircraft have their own GPS).	
Category	
Consequence	
Wrong or no position information from GPS.	
Probability	
Controls, Mitigations and Actions	
Associated Hazards	
Comments	
MCA Helicopter Pilots rely on a GPS based flight management system for navigation and depend on this at low altitudes for bad weather approaches.	
The MCA GPS based system is augmented and is subject to its own safety management.	
Pilots of other aircraft do not depend on GPS for navigation; At low altitude (below 600ft) aircrew perform a visual approach.	
The landing area is a flat area. It does not affect minimum safe altitude.	
GPS is always vulnerable to multipath and dropouts, which are dealt with the in the existing procedures.	
If GPS augmentation is introduced, it will be subject to its own safety management.	

B.14 CF14

Identified By	**Date Created**
HIRA 24-8-16.	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Impact from RFI/emissions on power supply system in aircraft.	
Category	
Technical Factors	
Consequence	
Damage to or loss of power supply in aircraft.	
Probability	
Controls, Mitigations and Actions	
ID	**Mitigation**
M26	LSA RFI assessment concluded that this is not a credible effect.
Associated Hazards	
Comments	

B.15 CF15

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated following meeting with MCA on 25 July 2017.	23-Aug-17
Description	
Interference with Maritime Coastguard Agency communications caused by RFI /emissions from/HV cables/facility.	
Category	
Technical Factors	
Consequence	
Probability	
Controls, Mitigations and Actions	
ID	**Mitigation**
M27	Liaise with MCA to identify possible hazards specific to its operation arising from IFA2.
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference
Associated Hazards	
ID	**Description**
HAZ01	Distraction of aircrew
HAZ06	Distraction of aircrew or control tower staff.
HAZ08	Distraction of aircrew or control tower staff.
HAZ13	Distraction of aircrew or control tower staff (class G airspace operations)
HAZ15	Distraction of aircrew or control tower staff, other than by distraction of aircrew caused by reflection from building structure and cladding (procedural non-radar operations)
HAZ16	Distraction of aircrew or control tower staff
HAZ25	Wrong or no altimeter reading
HAZ26	Unknown effect on MCA operations
Comments	
The station, mast and tower are on the airfield.	
MCA plans to install a MEOSAR satellite system (Medium Earth Orbit Search and Rescue), for search and rescue (SAR) distress alerting, have been assessed for EMC.	

B.16 CF16

Identified By	**Date Created**
HIRA 24-8-16	12-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Emissions from HV cables and facilities impacts Britten-Norman activities involving complex avionics and military aircraft.	
Category	
Technical Factors	
Consequence	
Unknown effect on Britten-Norman activities.	
Probability	
Controls, Mitigations and Actions	
ID	**Mitigation**
M28	Liaise with Britten-Norman to identify possible hazards specific to its operation arising from IFA2.
Associated Hazards	
ID	**Description**
HAZ27	Unknown effects on Britten-Norman operations
Comments	
Status of actions updated.	
A detailed study has been conducted to evaluate the potential impact on Britten-Norman activities.	
This study is being reviewed as part of the Phase 1 technical assessment to determine whether there are any gaps.	

B.17 CF17

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Impact on Radar due to emissions from HV cables/facility	
Category	
Technical Factors	
Consequence	
Temporary loss of radar.	
Probability	
Controls, Mitigations and Actions	
ID	**Mitigation**
M29	Liaise with NATS to identify possible hazards specific to its operation arising from IFA2.
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference
Associated Hazards	
ID	**Description**
HAZ28	Unknown effect of NATS operations
Comments	
Status of actions updated.	
No impact at the airport. The radar service is provided by Solent Radar.	
LSA RFI assessment concludes that it is unlikely that the facility would cause RFI to future radar.	
Needs to be confirmed that the NATS Radar system is only used for training purposes. A related hazard is retained until that is determined.	

B.18 CF18

Identified By	**Date Created**
HIRA 24-8-16.	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Ionising radiation from HV cables.	
Category	
Technical Factors	
Consequence	
Fire	
Probability	
Controls, Mitigations and Actions	
Associated Hazards	
Comments	
No credible mechanism for this causal factor has been identified.	

B.19 CF19

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description
Touch potential from HV cable layout or impressed voltage in fences (planned or existing) or existing LV cables.
Category
Technical Factors
Consequence
Electric shock/electrocution from touch potential.
Probability
Controls, Mitigations and Actions

ID	Mitigation
M30	Detailed surveys for existing services are to be undertaken before excavation of a trench to lay the cables. Any existing cables will either be revealed by the survey or exposed on excavation and moved/dealt with appropriately. Thus, subject to this being completed, the risk of electric shock from impressed and touch potentials will be eliminated by design.
M43	Cable protection system to ensure power is promptly removed in the event of an insulation failure.
M45	If any high-power AC cables run parallel or near-parallel to any metal fences or similar structures and run alongside for a significant distance, those structures are to be sufficiently earthed, and that earthing maintained sufficiently, to eliminate the risk of dangerous impressed and touch potentials.

Associated Hazards	
ID	**Description**
HAZ20	High 50Hz impressed and touch potentials in fences or LV cabling.

Comments
The power should be designed to trip out within 80ms if there is earth leakage. There should also be a backup system to force a power trip out within 500ms.
There are no fences that runs parallel and near to the cable route. There is no effect if cables cross the conductor at 90º. Note this is an AC not a DC issue so only relates to the AC circuits.
To be checked that is the southwest corner where the cables cross under the fencing whether the fencing is non-conductible. However, the fencing is earthed locally to ensure there is no step or touch potential problem.

B.20 CF20

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Emissions/RFI from KV cables/facility cause malfunctioning of UAV (e.g. drones).	
Category	
Technical Factors	
Consequence	
Loss of control of UAV.	
Probability	
Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M31	The communication strategy in place for flying UAVs to be studied further to determine possible risk.
M39	NG to Review RFI impact on UAVs.
Associated Hazards	
ID	**Description**
HAZ21	Loss of control of UAV.
Comments	
Note that the risk might be dependent on the location UAVs are permitted to fly in and controls on their operation.	

B.21 CF21

Identified By	Date Created
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17

Description
Heat generated from converter station - air density changes immediately above the facility impacts aircraft or gliders.
Category
Technical Factors
Consequence
Loss of control of aircraft/glider.
Probability
Extremely Improbable
Controls, Mitigations and Actions

ID	Mitigation
M07	Publicity and training to include awareness of possible wind effects.
M10	Airmanship provides mitigation.
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.
M42	The possible effects of heat from the facility on UAVs are to be reviewed.

Associated Hazards

ID	Description
HAZ02	Wind impact.
HAZ04	Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.
HAZ05	Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.
HAZ07	Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.
HAZ21	Loss of control of UAV.

Comments
Any change in temperature should be slight change (a few degrees) and is a localised. Aircraft/gliders will fly over the converter station on take-off but there should, therefore, be no material impact.
Potential for this to be notified to glider pilots, so they are aware of possible slight effects

B.22 CF22

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Merged with CF07	12-Apr-17
Description	
Compass miscalibrated due to calibration taking place in zone impacted by magnetic fields.	
Category	
Technical Factors	
Consequence	
Probability	
Controls, Mitigations and Actions	
Associated Hazards	
Comments	

B.23 CF23

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Equipment within the converter station catches fire and generates smoke impeding vision of aircrew	
Category	
Fire and Smoke	
Consequence	
Aircrew vision impeded.	
Probability	
Extremely Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M32	Design specifications to require fire protection systems to ensure that fire is controllable.
Associated Hazards	
ID	**Description**
HAZ22	Smoke impeding vision of aircrew.
HAZ23	Smoke impeding vision of aircrew
Comments	
Powered aircraft can divert from smoke; gliders would need to avoid or land.	
The proposed runway extension could mean that aircraft are at a lower altitude than at present when passing over the IFA2 site.	

B.24 CF24

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	24-Aug-16

Description
Wind impact, caused by building or landscaping (turbulence and unexpected changes in wind patterns, wind shear, and so on).
Category
Environmental Factors
Consequence
Loss of control of aircraft/glider.
Probability
Extremely Improbable
Controls, Mitigations and Actions

ID	**Mitigation**
M06	Wind assessment to determine the impact of the building on the wind patterns (including consideration of light aircraft and UAVs).
M07	Publicity and training to include awareness of possible wind effects.
M09	Effects of wind to be kept under review in the case of increased traffic.
M10	Airmanship provides mitigation.

Associated Hazards	
ID	**Description**
HAZ02	Wind impact.
HAZ04	Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.
HAZ05	Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.
HAZ07	Wind impact, caused by building (turbulence and unexpected changes in wind patterns, wind shear and so on). Note that the worst case at the airport is wind from north-east.

Comments
Note that changes in wind could cause distraction initially for glider pilots in particular, i.e. until they become familiar with the changed wind patterns.

B.25 CF25

Deleted after discussion with MCA. The “Unknown effect on MCA operations” is now known, and the effects addressed by other causal factors.

B.26 CF26

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Interference from high-voltage cables affects ground lighting.	
Category	
Technical Factors	
Consequence	
Malfunction of lighting (AGL) impacts aircraft landing at night.	
Probability	
Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M40	Any future AGL system to be designed to ensure interference from HV cables cannot credibly affect the lighting.
Associated Hazards	
ID	**Description**
HAZ24	Incorrect ground lighting intensity
Comments	

B.27 CF27

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Insulation failure of HV cables - impacts another system (e.g. AGL)	
Category	
Environmental Factors	
Consequence	
Damage / malfunction of equipment.	
Probability	
Controls, Mitigations and Actions	
ID	**Mitigation**
M43	Cable protection system to ensure power is promptly removed in the event of an insulation failure.
Associated Hazards	
Comments	
Updated for cable protection system assumptions as recorded at the workshop on the 11&12th April 2017.	
Based on the discussion at the workshop on the 11&12th April 2017, the power will trip out quickly (~80ms). There is also a backup system which would force a full power trip out in 500ms. The assumption to be verified by design specifications.	

B.28 CF28

Identified By	**Date Created**
HIRA 24-8-16.	24-Aug-16
Last Update Action	**Date of Last Update**
Closed based on the conclusion of that meeting that the risk is not specific to IFA2.	12-Apr-17
Description	
Future construction works (once converter station in operation) - digging in the vicinity of HV cables.	
Category	
Environmental Factors	
Consequence	
Electrocution / electric shock to future construction workers	
Probability	
Controls, Mitigations and Actions	
Associated Hazards	
Comments	
Managed by a separate process not relevant to this assessment.	
Cable location records to be retained within the Health and Safety File as required by Construction (Design and Management) (CDM) Regulations.	
A safe digging procedure shall be in place. All operation and future activities are subject to aerodrome regulations.	
No longer considered relevant to IFA2.	

B.29 CF29

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Future planning of landscaping - attracts birds near to airfield	
Category	
Environmental Factors	
Consequence	
Bird strike	
Probability	
Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M14	RCAM to discuss bird strikes with a wildlife expert and to seek the expert's advice on how to manage the bird activities in this area.
M15	FBC to consider the risk of bird strike in future landscaping and choice of trees, and so on.
Associated Hazards	
ID	**Description**
HAZ03	Bird strike
Comments	
The airport is close to the sea and green spaces that already attract birds.	

B.30 CF30

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Converter station warms air immediately above the converter station and attracts birds.	
Category	
Environmental Factors	
Consequence	
Probability	
Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M14	RCAM to discuss bird strikes with a wildlife expert and to seek the expert's advice on how to manage the bird activities in this area.
Associated Hazards	
ID	**Description**
HAZ03	Bird strike
Comments	

B.31 CF31

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Building design -flat roof - attracts birds	
Category	
Environmental Factors	
Consequence	
Bird strike.	
Probability	
Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M12	Building to provide appropriate access for bird management strategy.
Associated Hazards	
ID	**Description**
HAZ03	Bird strike
Comments	

B.32 CF32

Identified By	**Date Created**
HIRA 24-8-16	24-Aug-16
Last Update Action	**Date of Last Update**
Reviewed and updated at HIRA workshop 11&12th April 2017.	12-Apr-17
Description	
Tall trees	
Category	
Environmental Factors	
Consequence	
Tree growth impacts the obstacle limitation surface.	
Probability	
Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M07	Publicity and training to include awareness of possible wind effects.
M09	Effects of wind to be kept under review in the case of increased traffic.
M10	Airmanship provides mitigation.
Associated Hazards	
ID	**Description**
HAZ02	Wind impact.
Comments	

B.33 CF33

Identified By	**Date Created**
HIRA 12-4-17.	12-Apr-17
Last Update Action	**Date of Last Update**
Closed because not considered a credible hazard.	12-Apr-17
Description	
Fire as a result of fuel installation facility or fuel mobile bowsers being near the cable routes.	
Category	
Environmental Factors	
Consequence	
Fire on the airfield, smoke affects visibility for pilots.	
Probability	
Extremely Remote	
Controls, Mitigations and Actions	
ID	**Mitigation**
M44	The location of the fixed fuel installation and filling points for mobile bowsers is not near the HV cables.
Associated Hazards	
Comments	
The cabling cannot credibly cause ionising levels of radiation.	

B.34 CF34

Identified By	**Date Created**
HIRA 12-4-17	12-Apr-17
Last Update Action	**Date of Last Update**
Closed because no credible hazard was identified.	12-Apr-17
Description	
RFI / interference with Aeronautical Fixed Telecommunication Network (AFTN) causing loss of data.	
Category	
Technical Factors	
Consequence	
AFTN is not currently used. However AFTN is related to FIS, might be used in future. AFTN is not mandatory. No significant effect.	
Probability	
Controls, Mitigations and Actions	
Associated Hazards	
Comments	
New causal factor - not considered to result in a credible hazard.	

B.35 CF35

Identified By	**Date Created**
HIRA 12-4-17	12-Apr-17
Last Update Action	**Date of Last Update**
Closed because no credible hazard identified	12-Apr-17
Description	
Insufficient drainage causing water ingress and flooding.	
Category	
Consequence	
No safety impact identified; operational issues only.	
Probability	
Controls, Mitigations and Actions	
Associated Hazards	
Comments	

B.36 CF36

Identified By	Date Created
HIRA 24-8-16	12-Apr-17
Last Update Action	**Date of Last Update**
Created	12-Apr-17

Description
Terrorist attack on IFA2
Category
Terrorist Incident
Consequence
Unknown effect - needs results of threat assessment.
Probability
Controls, Mitigations and Actions

ID	Mitigation
M37	A threat assessment to be conducted to determine the threat levels, using input from NG and FBC.

Associated Hazards	
ID	**Description**
HAZ17	Terrorist attack on IFA2
Comments	

APPENDIX C CONTROLS, MITIGATIONS AND ACTIONS

The “Assigned to” column is intentionally blank. Those mitigations that are not complete are taken through as dependencies in the safety justification [2] and tracked through the risk management plan.

ID	Description	Status	Comments	Assigned To
M01	Building lighting to be directed downwards, away from flight paths and control tower, and not towards the runway. This requirement is to be included in the design specifications.	Open		
M02	The design of all road lighting to be compliant with BS 5489 [6] Section 12.2: Lighting in the vicinity of aerodromes.	Closed		
M03	External surfaces of building to be designed not to present a distraction to aircrew.	Open		
M04	Noise levels to be managed to ensure they are not distracting to pilots, particularly glider pilots.	Open		
M05	Aircrew and airport ground operators to be kept up-to-date with changes and likely effects.	Open		
M06	Wind assessment to determine the impact of the building on the wind patterns (including consideration of light aircraft and UAVs).	Closed		
M07	Publicity and training to include awareness of possible wind effects.	Open		
M08	Obstacle clearance surfaces to be protected.	Open		
M09	Effects of wind to be kept under review in the case of increased traffic.	Closed		
M10	Airmanship provides mitigation.	Closed		
M11	RCAM to ensure an effective bird management strategy.	Open		
M12	Building to provide appropriate access for bird management strategy.	Open		
M13	The building design to discourage a significant increase in the bird activities or detrimental changes in bird behaviour in this area.	Open		
M14	RCAM to discuss bird strikes with a wildlife expert and to seek the expert’s advice on how to manage the bird activities in this area.	Closed		
M15	FBC to consider the risk of bird strike in future landscaping and choice of trees, and so on.	Closed		
M16	If communications dead spots are found, appropriate procedures are to be put in place to manage the resulting risk.	Open		

ID	Description	Status	Comments	Assigned To
M17	Planning Constraints to limit permitted noise from IFA2 (taking the proposed runway extension into account).	Closed		
M18	Airport authority to publicise the start of operations of the IFA2 in advance to airfield users.	Open		
M19	RCAM, in collaboration with NG, to confirm that the magnetic fields at the compass base could not credibly lead to incorrect calibration of magnetic compasses.	Open		
M20	Pre-flight check area to be assessed for effect of magnetic fields on the setting of aircraft direction indicators.	Open		
M21	RCAM to promulgate instruction to calibrate magnetic compasses only at compass base.	Open		
M22	General airmanship provides a mitigation because aircrew should quickly identify incorrect calibration by reference to visual landmarks.	Closed		
M23	RCAM to promulgate instruction not to set DIs against magnetic compasses in zones likely to be subject to magnetic interference.	Open		
M24	FIS procedures to take into account the possibility of impairment of ground-ground communications.	Open		
M25	If aircraft using radio altimetry are likely to use the airport, the effect of the IFA2 on radio altimetry is to be assessed.	Open		
M26	LSA RFI assessment concluded that this is not a credible effect.	Closed		
M27	Liaise with MCA to identify possible hazards specific to its operation arising from IFA2.	Closed		
M27	Liaise with MCA to identify possible hazards specific to its operation arising from IFA2.	Closed		
M28	Liaise with Britten-Norman to identify possible hazards specific to its operation arising from IFA2.	Closed		
M28	Liaise with Britten-Norman to identify possible hazards specific to its operation arising from IFA2.	Closed		
M29	Liaise with NATS to identify possible hazards specific to its operation arising from IFA2.	Closed		
M29	Liaise with NATS to identify possible hazards specific to its operation arising from IFA2.	Closed		

ID	Description	Status	Comments	Assigned To
M30	Detailed surveys for existing services are to be undertaken before excavation of a trench to lay the cables, any existing cables will either be revealed by the survey or exposed on excavation and moved/dealt with appropriately. Thus, subject to this being completed, the risk of electric shock from impressed and touch potentials will be eliminated by design.	Open		
M31	The communication strategy in place for flying UAVs to be studied further to determine possible risk.	Open		
M31	The communication strategy in place for flying UAVs to be studied further to determine possible risk.	Open		
M32	Design specifications to require fire protection systems to ensure that fire is controllable.	Open		
M34	Lighting signals can be used if RF levels are exceptionally sufficiently high to cause interruption to radio communications systems.	Open		
M35	All electrical systems to be designed to ensure RF levels are too low for significant interference.	Open	LSA RFI assessment showed that emissions are below the levels at which interference would occur, and the probability of inference to radios is very low for current airfield operations. There is no credible risk of equipment damage.	
M36	Intentionally blank.			
M37	A threat assessment to be conducted to determine the threat levels, using input from NG and FBC.	Open		
M38	Project documentation to show that AC and direct current (DC) fields comply with requirements.	Open		
M39	NG to Review RFI impact on UAVs.	Open		
M40	Any future AGL system to be designed to ensure interference from HV cables cannot credibly affect the lighting.	Open		
M41	This risk of public exposure to electromagnetic fields is eliminated provided the planning constraint for emissions is met.	Closed	The limit is ~10uT which is sufficiently below the regulations limit for the public (~100uT) and workers (~500uT).	
M42	The possible effects of heat from the facility on UAVs are to be reviewed.	Open		

ID	Description	Status	Comments	Assigned To
M43	Cable protection system to ensure power is promptly removed in the event of an insulation failure.	Open		
M44	The location of the fixed fuel installation and filling points for mobile bowsers is not near the HV cables.	Open		
M45	If any high-power AC cables run parallel or near-parallel to any metal fences or similar structures and run alongside for a significant distance, those structures are to be sufficiently earthed, and that earthing maintained sufficiently, to eliminate the risk of dangerous impressed and touch potentials.	Open		

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