Appendix X

Wake Vortex Statement

Heathrow
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Wake Vortex - Implementation of full runway alternation during easterly operations at Heathrow Airport

Introduction

The London Borough of Hillingdon (LBH) has requested that an assessment of the potential effects from wake vortex of implementing full runway alternation at Heathrow Airport is undertaken.

Under current westerly operations at Heathrow, for aircraft arrivals onto runway 27R, incidences of wake vortex strike have previously been most likely to occur to the east of the airport in the high density areas of Cranford and Heston. Arrivals on runway 27L have led to reported wake vortex strikes in Hatton and Hounslow. Heathrow Airport Limited (HAL) has designated these areas as 'blanket zones' predicated on the verified incidence of vortex strike damage to properties from arriving aircraft and extending up to approximately four kilometres from the runway ends of runways 27L and 27R.

HAL currently operates a successful Wake Vortex Protection Scheme providing that any roof damage attributed to wake vortex strike, and verified by one of HAL's appointed assessors, will be repaired with remedial measures such as roof strengthening through various mechanisms to be robust enough to withstand any future strike.

During full runway alternation, departing aircraft will be able to use both runways for both departure and arrival of aircraft where previously this was limited to arrivals on 09L and departures on 09R.

Accordingly, this report provides an assessment of the potential effects from wake vortex for proposed operational changes in accordance with full runway alternation during easterly operations at Heathrow Airport.

Wake Vortex

The phenomenon of wake vortex refers to the rotating air masses generated from the displacement of air from an aircraft's wing tips whilst in-flight. Pairs of wake vortices (i.e. counter rotating cylindrical air spirals) trail behind the aircraft and tend to descend and spread laterally as they rotate, eventually dissipating into general air turbulence.

Typically, wake vortex effects are associated with arrivals (particularly during the final stages of approach) when an aircraft's airspeed and altitude are low. Large, wide-bodied aircraft such as B747/777s and A380s tend to generate wake vortices of sufficient strength and residual energy to cause property damage in certain circumstances. This is because the airspeed and altitude of aircraft on final approach are low as flaps and landing gear have been deployed to stabilise the aircraft's arrival.

The frequency with which wake vortices cause property damage is driven by many factors, including the number of aircraft movements and the proportion of the large, wide-body aircraft operating to/from the airport, the prevailing meteorological conditions and the topography and surface features

surrounding the airport. Damaging strikes occur most frequently when conditions are calm, because there is less natural air turbulence to promote the dispersal of vortex energy. The incidence of vortex damage to properties is also highly dependent on the density of development and roof structures of the buildings.

Assessment

During easterly operations and the implementation of full runway alternation, an increase in the number of arrivals on runway 09R can be expected, with a corresponding reduction in the number of arrivals on 09L. Depending on the relative density of development below the flight path, there may be changes in the number of incidences of wake vortex strike. Arrivals to the west under the arrival path for runway 09R have the most potential for an increase in vortex strikes.

Westerly operations typically occur for around 71% of the year for the airport with easterly operations occurring for the remainder (29%).

Historically (Since 1974), under these operations where full runway alternation was restricted on easterly operations, Heathrow Airport designated 36 streets within the blanket zones of the Wake Vortex Protection scheme.

Table X1 shows the confirmed vortex strike incidences recorded in 2010 an 2011.

Table X1 Confirmed Wake Vortex Strikes in 2010 and 2011

2010	Vortex Strike Incidences	2011	Vortex Strike Incidences
Jan	8	Jan	1
Feb	8	Feb	1
March	13	March	5
April	6	April	10
May	10	May	15
June	8	June	9
July	24	July	7
August	13	August	8
September	11	September	9
October	5	October	6
November	2	November	0
December	0	December	0

A review of vortex strike records maintained by HAL for Heathrow Airport indicates an annual average of approximately 102 verified strikes for the period between 2006 and 2010. As shown above, the incidence of vortex strike has been reduced over 2010-2011. This can be due to a number of factors

but mainly because of the increased protection of individual properties under the Wake Vortex Protection Scheme.

Current operations determine that during westerly operations, the most likely area to be impacted by the incidence of vortex strike is during arrivals on runway 27R. The most likely area to be impacted by vortex strikes is Cranford.

Historically to date (from 1974 to current), there have been over 2,100 confirmed incidences of vortex strike within the Cranford area.

Within other risk areas such as Hatton and Poyle, the incidences of confirmed vortex strike have been minimal due to arrival and departure procedures and the prevailing westerly operations for a majority of the year.

The anticipated risk areas for potential increases in wake vortex strike are located within a relatively small number of homes within Stanwell Moor and a section of Coppermill Road. Currently, a total of two confirmed vortex strikes have been recorded within the Stanwell Moor location. This represents only 1% of the total number of properties located on Hithermoor Road. No other streets have recorded any vortex strikes.

With the proposed full runway alternation operational for easterly operations, changes to arrivals on runway 09R will occur only 14.5% of the time (14.5 % of arrivals will occur on 09L during runway alternation).

Only a small proportion of homes at Stanwell Moor and a section of Coppermill Road located approximately three kilometres to the west under the arrival path for runway 09R have the potential for an increase in vortex strike.

In addition, the final five kilometres of the arrivals flight path for runway 09R is predominantly over water bodies, semi-rural land, the M25 motorway and other highway infrastructure and are unlikely to be affected by wake vortex.

Properties located in Cranford (approximately 1.2km away from the end of runway 09L) that could be affected by easterly departures from runway 09L, including at Waye Avenue, Berkeley Avenue, Meadowbank Garden, Clevedon Gardens, Mornington Crescent, Field Close, Burnham Gardens and Byron Avenue, are already designated within the ‘blanket zones’ and covered by the vortex protection scheme.

HAL will continue to operate the Wake Vortex Protection Scheme and therefore any newly affected areas would be covered and damage, verified by one of HAL’s appointed assessors, will be repaired with remedial measures such as roof strengthening in the form of fastening new tiles with purpose-designed clips and nailing systems robust enough to withstand the maximum force of any future strikes.

If necessary, HAL would also extend the blanket schemes to any newly affected areas (where 65% of homes have received a confirmed vortex strike).

The incidence of additional wake vortex strike due to the proposed full runway alternation is therefore **not considered to be significant.**