Policy Recommendation on Sub-Cap on Off-Peak Landing and Take off Charges

1. In making a new Determination, the Commission must establish what, if anything can be achieved through peak/off peak pricing. In particular, whether the sub-cap on off peak landing and take off charges is still an appropriate restriction on the Dublin Airport Authority.
2. WHA Ltd was requested to assist in the preparation of data, specifically 2004 records of aircraft movements at Dublin Airport, such that an appropriate subset could be chosen to provide the basis for the necessary analysis.[1]

CRITERIA FOR "OFF PEAK"

3. In defining peak and off peak periods, the task is to examine forecasted traffic patterns relative to the capacity to handle them at the time of the introduction of an increment of capacity.[2] At the time of the first determination, Aer Rianta suggested that a second parallel runway would be required to be operational by 2007, so the task was to examine forecasted traffic patterns relative to capacity in 2007.
4. The need to allow sufficient flexibility for the "shifting peak" phenomenon, whereby demand responds to differential pricing leading to changes in the patterns of peak and off peak periods, caused the Commission to move away from strict application of the principle in 3 and to adopt the following rather conservative criteria for the definition of off peak periods:
   a. Periods of at least 1 hour in duration;
   b. Periods during which the average number of aircraft movements per 15-minute interval was less than or equal to 6.

   The hypothesis was that periods determined in this way would be unlikely to become peak periods due to peak shifting.
5. The Commission adopted a seasonal approach. The summer months include all days from 1 April to 31 September and the daily off peak periods included all night between 2130 and 0559, a morning period 0800-0859, an afternoon period 1500-1629, and an evening period 1915-2059. The winter months include all days from 1 October to 31 March and the daily off peak periods included all night between 2100 and 0744 and an afternoon period 1545-1744.

[1] See Annex for a full description of the tasks carried out by WHA Ltd.

[2] The periods in which demand is projected to exceed the capacity of the existing system can be thought of as having a higher value because it is these periods when airport users place the greatest demands on the airport. In the short run, this is manifested in the congestion and delay externalities imposed on other airport users. In the long run, it is demand during these periods that motivate capacity investment.

2004 TRAFFIC PATTERNS[3]

6. This section summarizes the 2004 traffic distributions of the representative days chosen according to the four methodologies applied by WHA Ltd and outlined in the Annex. The results of the application of those methodologies are presented in the table below, along with aircraft movement totals for the representative days.

		Date of Occurrence	No. of Deps Aircraft Mvmts	No. of Arrival Aircraft Mvmts	Total No. of Aircraft Mvmts
Method 1 (M1)	Summer	20/08/2004	273	269	542
	Winter	19/11/2004	236	246	482
Method 2 (M2)	Summer	03/09/2004	266	264	530
	Winter	26/03/2004	230	233	463
Method 3 (M3)	Summer	25/07/2004	270	275	545
	Winter	10/03/2004	248	247	495
Method 4 (M4)	Summer	23/07/2004	269	269	538
	Winter	14/10/2004	245	246	491

7. The busiest representative days are those chosen by M3. This is closely matched in summer by M1 (and less so by M4) and in winter by M4 (and less so by M1). M2 chooses less busy days. Attention will be focused on M3 because the methodology is consistent with that applied by WHA Ltd in assessing the capacity of Dublin Airport. M1 and M4 will be considered in turn, while M2 will be considered in terms of a lower bound and, arguably, less representative of the peak.

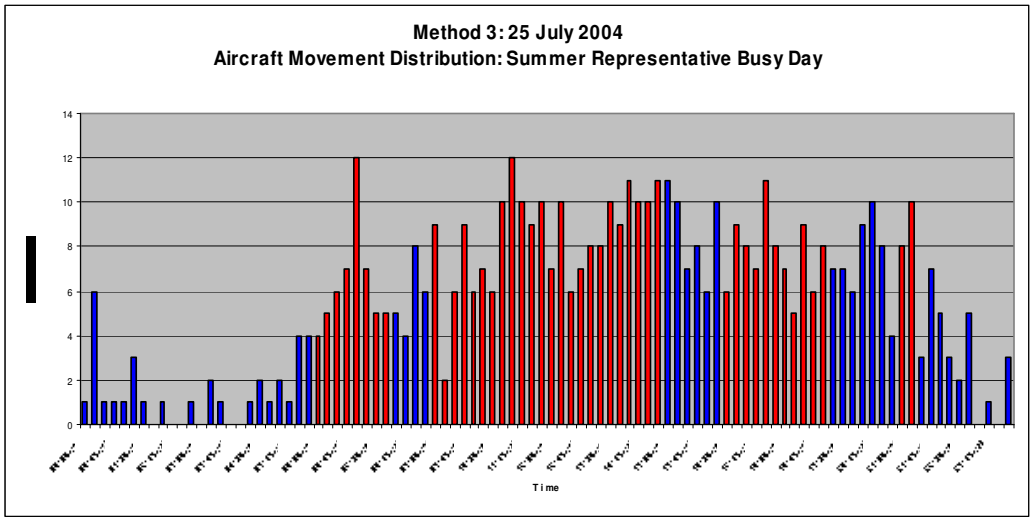
8. The threshold value of 6 movements per 15-minute interval is used as a benchmark against which changes can be measured. Periods deemed peak in 2001 that show 15-minute average movement rates below 6 in 2004 does not imply that these periods should now be deemed as off peak. Rather, it should only be inferred that, since 2001, there may have been shifting from these periods into the off peak periods (as defined) or that growth in these periods has been negative.

Summer

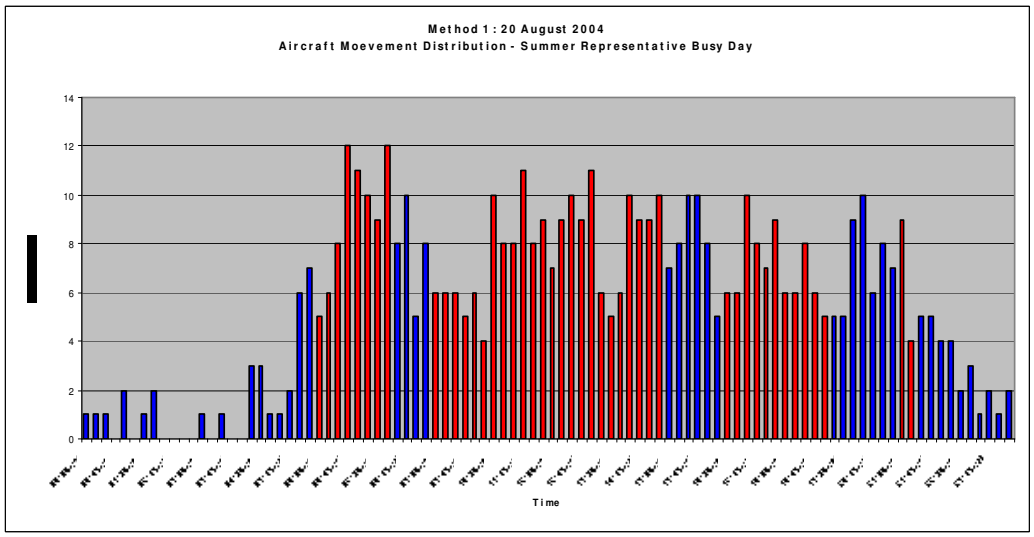
9. The traffic distribution of 25 July 2004 (the representative summer day chosen by M3) is presented below. Bar the overnight and the morning period 0800-0859, each of the off peak periods had an average number

[3] In each of the aircraft movement distributions, blue bars represent off peak periods.

of movements per 15-minute interval that was greater than 6. On the days chosen by M1 (see below), M4 and M2 (see Annex II), the only exception to this observation is the overnight period.



10. The traffic distribution for 20 August 2004 (the representative day chosen by M1) is shown below. It shows the average number of movements per 15-minute interval during the peak period 0900-1029 to be less than 6. The distribution for 3 September (M2) shows an average of less than or equal to 6 movements in the period 1430-1700 (which incorporates the afternoon off peak 1500-1629 plus a half hour of peak on either side) and the peak period 1745-1914.

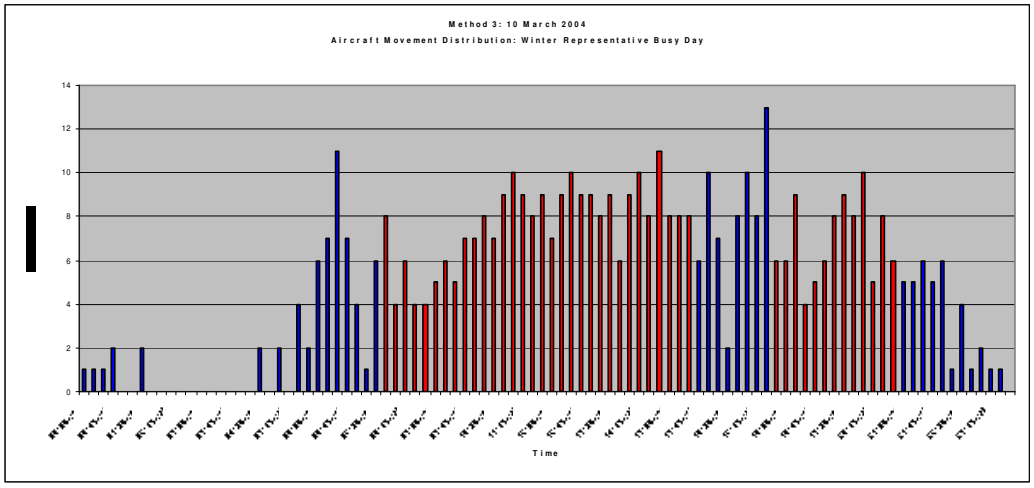


11. In general, therefore, traffic would appear to have become more evenly distributed across the day. Daytime off peaks are less distinguishable from peak periods relative to 2000 traffic patterns and the 2001 projections of 2007 traffic patterns. There appears also to be greater activity in the early morning and in the late evening, which might cast

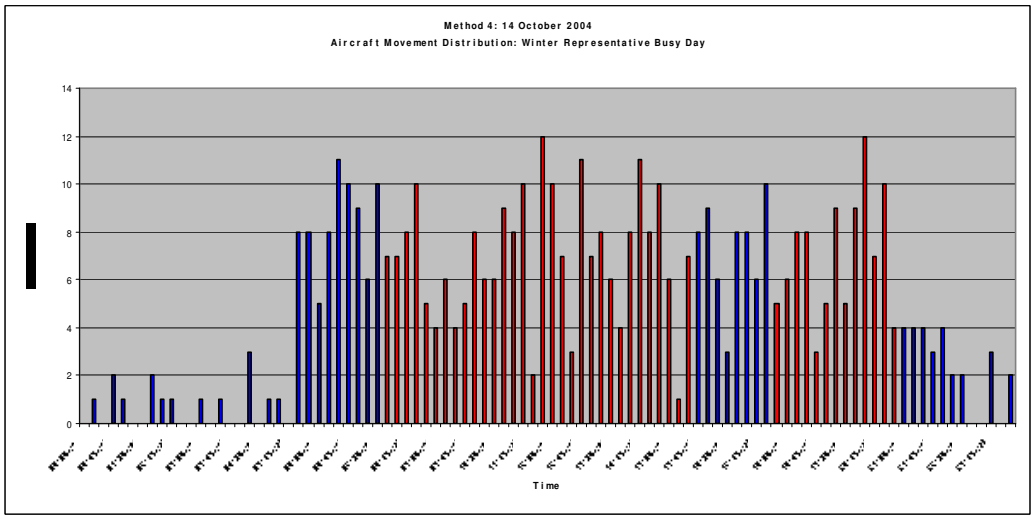
doubt over the length of the overnight period that was deemed off peak in 2001.

Winter

12. The traffic distribution of 10 March 2004 (the representative winter day chosen by M3) is presented below. The afternoon off peak had an average number of movements per 15-minute interval that was greater than 6. The same is observed on the representative days chosen by M4 (see below), M1 and M2 (see Annex II).



13. The traffic distributions of 10 March (M3) and of 14 October 2004 (M4) show significantly greater activity in the hour (and sometimes two hours) up to 0744 and in the hour or so after 2100, which might again cast doubt over the length of the overnight period that was deemed off peak in 2001.



14. There are several incidences of peak periods where the average number of movements per 15-minute interval is, in 2004, less than or equal to 6. On 10 March (M3), 0800-1044 and 1745-1929 are two such periods. On 14 October (M4), 0844-1059 and 1745-1859 are another two. Note the

similarities. On 19 November (M1) and 26 March (M2), the periods 1000-1159 and 1900-2059 display these properties (see Annex II).

15. As in summer, therefore, traffic would appear to be more evenly distributed across the day. The daytime off peaks is unambiguously less distinguishable from the surrounding peaks relative to 2000 traffic patterns and the 2001 projections of 2007 traffic patterns. There is also greater activity in the early morning and in the late evening, casting doubt over the length of the overnight period that was deemed off peak in 2001.

NEW "OFF PEAK" USING SAME CRITERIA

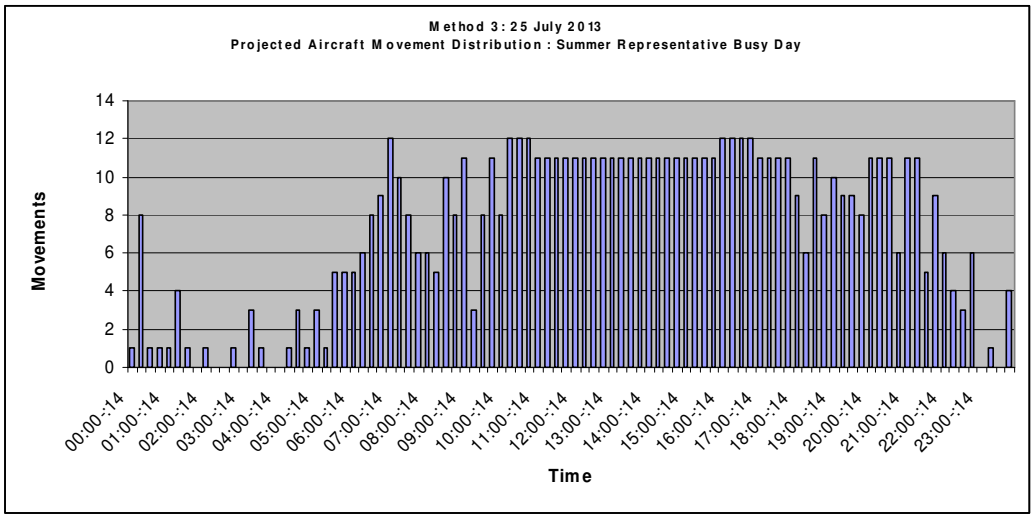
16. The Dublin Airport Authority is now proposing that a second parallel runway would be operational by 2013 at the earliest. Therefore, in seeking to establish whether there is a clear delineation of peak and off-peak periods, the task is to analyse forecasted traffic patterns relative to capacity in 2013.

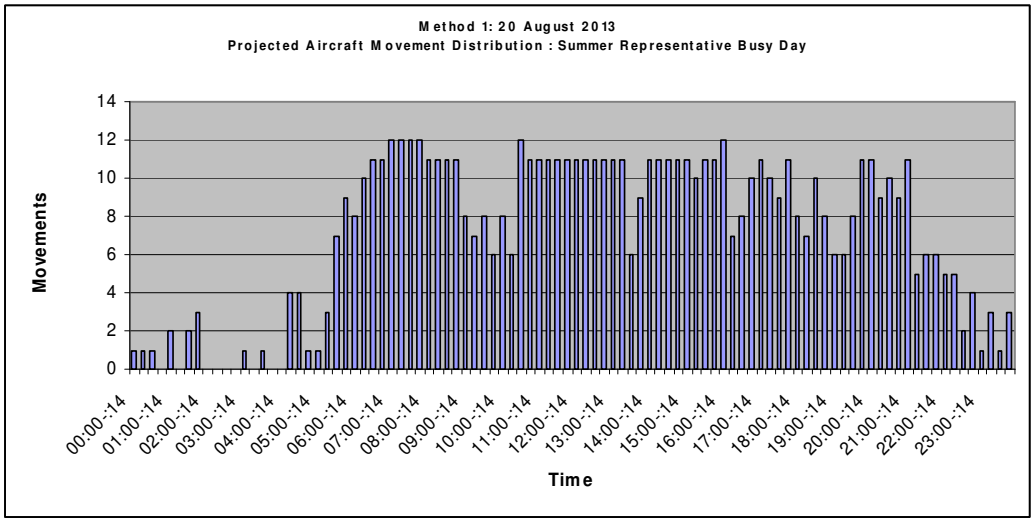
17. Based on the DAA's centerline traffic forecasts, aircraft movements are expected to increase by 26% by 2013. It is assumed that the same increase applies to the number of movements in each of the 15-minute intervals across the day.

18. The sustainable hourly capacity of the existing system is assumed to be 44 movements by 2013. According to a DAA presentation to airlines and other airport users on 4 April 2005, a number of peak hours are expected to be able to handle 49-50 movements per hour. Therefore, for the purposes of arriving at projected traffic distributions on the chosen representative days in 2013, the capacity per 15-minute interval is assumed to be 11 movements, and 12 movements during the peak hours 0700-0759, 1000-1059 and 1600-1659. This is important for spreading traffic to the shoulders in instances where the forecasted number of movements in 2013 in a 15-minute interval exceeds the interval's capacity. For example, if a 15-minute interval witnessed 12 movements in 2004, the 2013 projection for that period is 12*1.26 = 15. But 15 movements exceeds the capacity of the interval so, as would happen in practice, the excess spills out into other adjacent periods.

Summer

19. The projected traffic distribution for 25 July 2013 (M3) is presented below. Bar the overnight period from 2200 to 0614, there are no periods that satisfy the existing criteria for defining off peak periods. The distribution for 20 August 2013 (M1) shows a similar picture. Bar the overnight period from 2200-0530, there are no periods that satisfy the existing criteria for off peak.



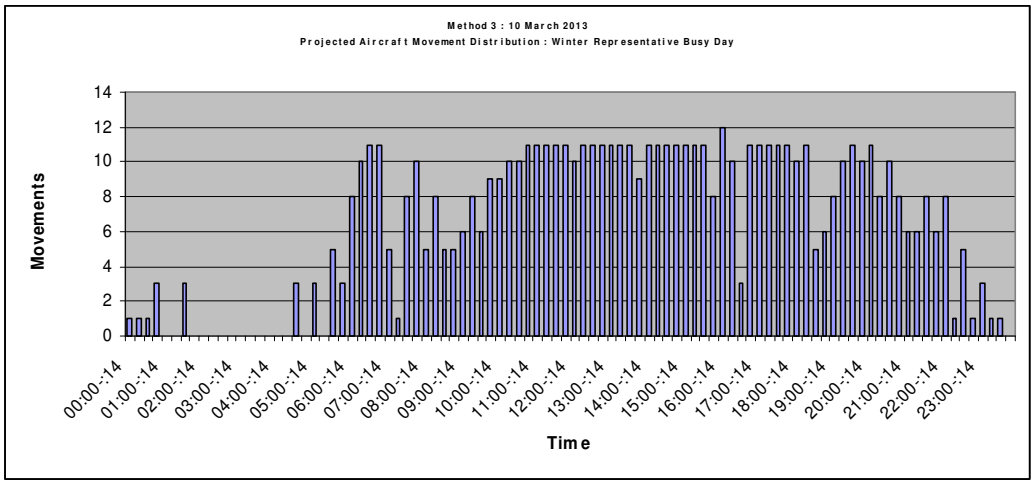


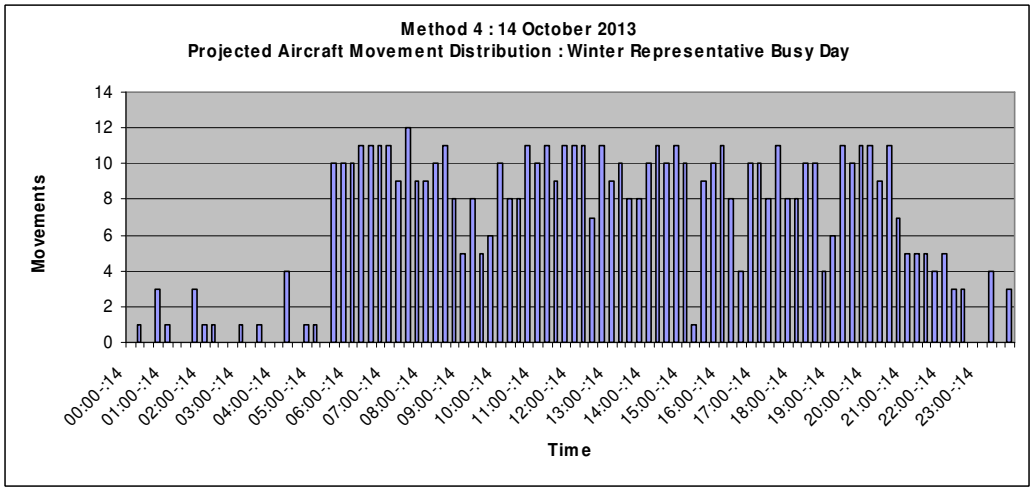
20. The projected distributions for 23 July 2013 (M4) and 3 September 2013 (M2) presented in Annex II show a similar picture. The respective overnight periods are 2200-0530 and 2130-0530.

Winter

21. The projected traffic distribution for 10 March 2013 (M3) is presented below. The overnight period that satisfies the existing criteria for off peak is 2215-0559. The morning period 0700-0915 also satisfies the criteria. However, on all the other representative days, this period significantly exceeds an average of 6 movements per 15-minute interval.

22. The projected distribution for 14 October 2013 (M4) is also presented. The overnight period 2045-0529 is the only one that satisfies the existing criteria.





23. The projected distributions for 19 November 2013 (M1) and 26 March 2013 (M2) are presented in Annex II. On 19 November, the overnight period that satisfies the existing criteria is 2230-0629. An evening period 1900-1959 also meets (exactly) the existing criteria. However, on all the other representative days, this period significantly exceeds an average of 6 movements per 15-minute interval. On 26 March, only the overnight period 2145-0630 satisfies the existing criteria.

Conclusion

24. Based on the sample analysed and the existing criteria for defining off peak periods (periods of at least one hour in duration in which the average number of movements is less than or equal to 6), only the overnights are candidates for off peak status during summer.

25. In winter, the overnights are, again, candidates for off peak status. Also candidates are the morning period 0700-0914 and the evening period 1900-1959. However, the fact that the existing criteria is projected to be substantially met in these periods on only 1 each out of 4 representative busy days is unlikely to provide a robust basis for defining these periods as off peak.

NEW CRITERIA FOR "OFF PEAK"

26. It was noted in paragraph 4 that the existing criterion for defining off peak periods is rather conservative. A quick glance at the projected 2013 distributions reveals that the troughs that could be interpreted as off peak are much shallower than before. A reasonable interpretation is that the stated timing of the need for the proposed second runway is more accurate because, by that time, existing capacity is projected to be utilized more efficiently than before.

27. However, there may still be room for improvement. In other words, it may be possible to push the proposed operational date of the second runway back further until a time when existing capacity is projected to be even more thoroughly exhausted. The projected 2013 sample distributions suggest that there might still be room to accommodate traffic growth for another year or two.

28. The question then is whether retaining the sub-cap on off peak landing and take off charges might provide the corresponding incentives to Dublin Airport Authority. Economic theory says it will and this was the basis for the introduction of the sub cap in 2001. Those arguments have been well-rehearsed.

29. In practice, it must be noted that the two main airlines operating at Dublin Airport (Aer Lingus and Ryanair) have stated that the differential between peak and off peak prices at the airport is not a binding factor influencing their scheduling decisions. On the other hand, in the 'co-ordinated' environment to be in place by summer 2006, the existence of lower off peak prices may provide an incentive to airlines who have requested slots at congested peak times to shift to those off peak times.

30. If the Commission were to decide that there was a case for retaining the sub-cap, the off peak periods would need to be re-defined to better reflect prevailing patterns of usage. However, given that (as noted above) the troughs are much shallower than before, it would be necessary to adopt less conservative criteria for the definition of off peak periods. The following provides an analysis of candidate off peak periods based on the following modified criteria:

    a. Periods of at least one hour in duration;

    b. Periods during which the average number of aircraft movements per 15-minute interval is less than or equal to **8** (rather than 6).

Summer

31. The table below shows the candidate off peak periods suggested by each of the 4 representative summer days.

Summer	**Overnight**	**Morning**	**Afternoon**	**Evening**
M3 (Sun)	2200-0614	0745-1014		
M1 (Fri)	2115-0545	0915-1044		1814-1959
M4(Fri)	2200-0530			1900-2059
M2 (Fri)	2130-0530		1515-1714	1800-1914

32. The overnight off peak might reasonably be set as 2200-0530, as this is common to all sampled days. The projected distributions for 25 July (M3) and 20 August (M1) suggest a morning off peak, extending for at least an hour from 0915 to 1014. Three of the sampled days suggest the possibility of an evening off peak, extending for at least an hour from 1815 to 1914. M1 and M4 suggest that this could be extended to at least 1959. Only the projected distribution for 3 September (M2) suggests an afternoon peak. However, this is a lower bound and arguably a less representative pattern of usage.

Winter

33. The table below shows the candidate off peak periods suggested by each of the 4 representative winter days.

Winter	**Overnight**	**Morning**	**Afternoon**	**Evening**
M3 (Wed)	2215-0559	-1045		2015-
M4(Thurs)	2045-0529	0830-1044	1500-1644	1745-1914
M1 (Fri)	2230-0629	1015-1144	1245-1814	1900-1959
M2 (Fri)	2145-0630	0945-1159	1445-1559 / 1630-1814	1945-2115

34. The overnight off peak might reasonably be set as 2230-0530, being common to all sampled days. The projected distributions for all of the sample days suggest a morning off peak that might extend for two hours from 0830 to 1029 (paying particular attention to M3 and M4). Three of the sampled days suggest the possibility of an afternoon off peak, extending for at least an hour from 1500 to 1559, but which could reasonably extended to beyond 1600. All representative days suggest an evening off peak, that might reasonably extend for at least an hour from 1900 or 1930 to 1959 or 2029 respectively.

CONCLUSIONS

35. Based on the existing criteria for defining off peak periods, there are no candidate periods for off peak status during summer, bar the overnight period. In winter, there are a number of candidate periods, including the overnight, 0700-0914 and 1900-1959. The morning and evening candidates were, however, observed only one each out four representative busy days. This does not provide a robust basis for defining these periods as off peak.

36. The Commission could adopt the new criteria outlined in the previous section. However, any off peak periods defined on the basis of these less conservative criteria would be more likely to change as a result of peak shifting. This might cause periods defined as off peak to become peak periods and those defined as peak to become off peak, which might, in turn, result in distortion of the incentives associated with the sub cap. In order to prevent this, the Commission might have to re-define the off peak periods at the end of each year. However, this might cause undesirable uncertainty for airlines.

ANNEX I

WHA LTD BRIEF

WHA Ltd was requested to assist in the preparation of the data such as to enable the analysis of a subset of 2004 traffic at Dublin Airport. On foot of the above request, the tasks carried out by WHA Ltd can be described (loosely) as follows:

a. Removal from the dataset of helicopter movements, double-counted transatlantic movements and General Aviation, such that the dataset only contained scheduled, technical charter, cargo and positioning flights;

b. Accumulation of the data to arrive at daily totals for the number of aircraft movements (including the split between departing and arriving);

c. Choice of representative busy days on which to base the analysis according to:

   i. The methodology used in 2001;

   ii. Three alternative methodologies chosen by WHA Ltd;

d. Extraction and profiling of each representative busy day into 15-minute time slots and presentation in diagrammatic (bar chart distributions) form.

METHODOLOGIES FOR THE CHOICE OF REPRESENTATIVE BUSY DAYS

Method 1

This involved choosing the 15th busiest day of each of the summer and winter months. This is a straightforward application of the IATA principle of choosing the 30th busiest day.[4] The chosen days were 20 August for summer and 19 October for winter.

Method 2

This method is the same as the method used in 2001 with a slight modification and required two steps, as follows:

1. Choice of the busiest day of the week for each of the summer and winter periods, which was Friday[5];
2. Determination of the 15th busiest Friday for each of the summer and winter periods.

The chosen days were 3 September for summer and 26 March for winter.

[4] See International Civil Aviation Organisation (ICAO), "Airport Planning Manual, Part 1: Mster Planning," Second Edition, 1987, Doc 9184-AN/902 Part 1.

[5] The method used in 2001 involved choosing the busiest day of the week for the year as a whole, after which the split between summer and winter is applied. That was and is also a Friday.

Method 3

This method required a number of steps as follows:

1. Ranking of the days of each of the summer and winter periods in descending order and according to the number of aircraft movements;
2. Calculation of the daily cumulative totals;
3. Determination of the days for each of summer and winter when the daily cumulative total reaches 5% of total aircraft movements for the season.

The chosen days were 25 July for summer and 10 March for winter.

Method 4

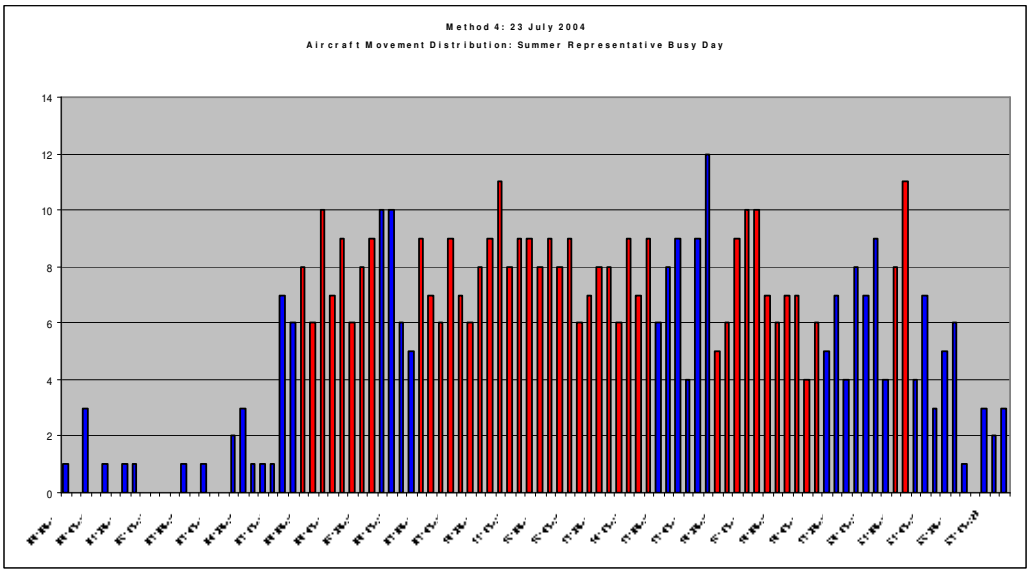
Method 4 also required a number of steps as follows:

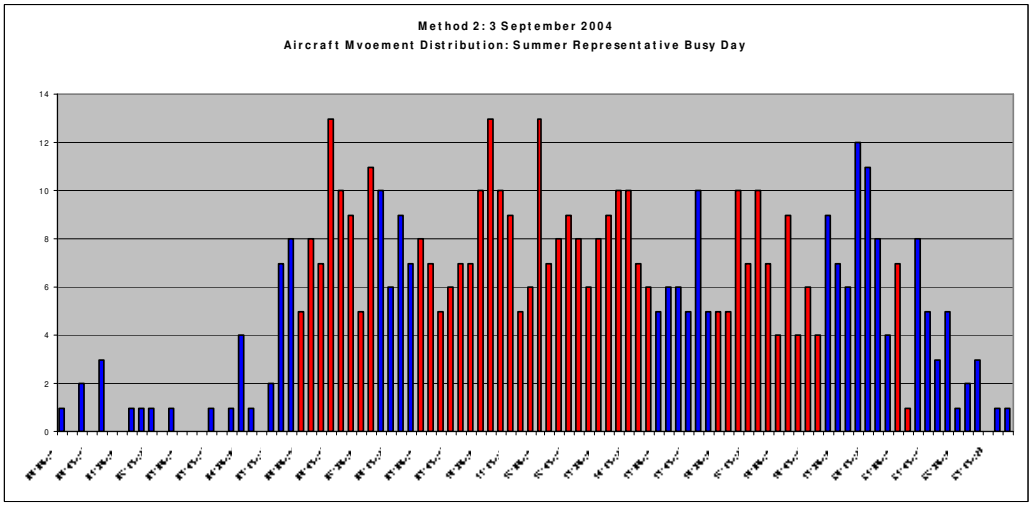
1. Choice of the busiest month in each of the summer and winter periods;
2. Calculation of the average week by averaging, for each day, across the busiest months;
3. Choice of the 2nd busiest days of the average weeks;
4. Determination of the days for each of summer and winter, whose total number of aircraft movements is closest to the 2nd busiest days.

The chosen days were 23 July for summer and 14 October for winter.

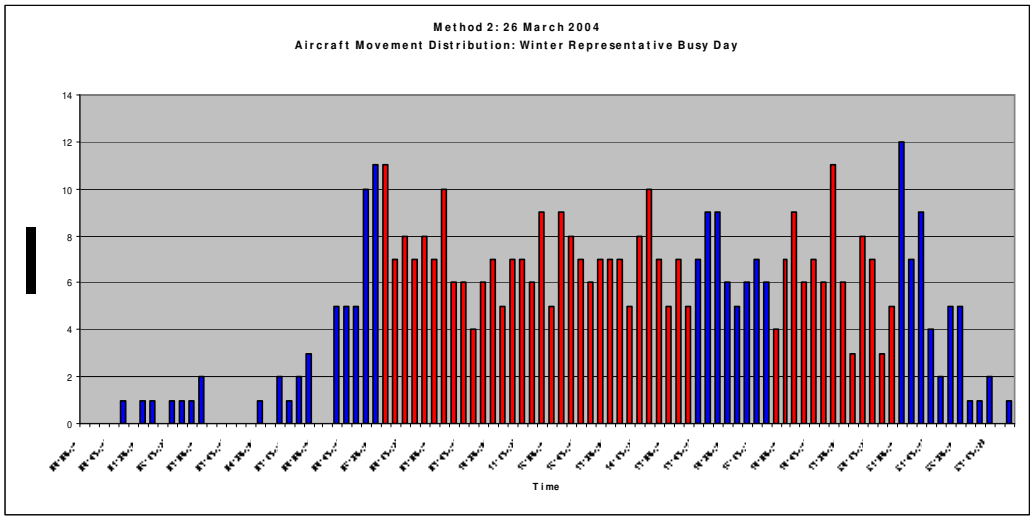
ANNEX II

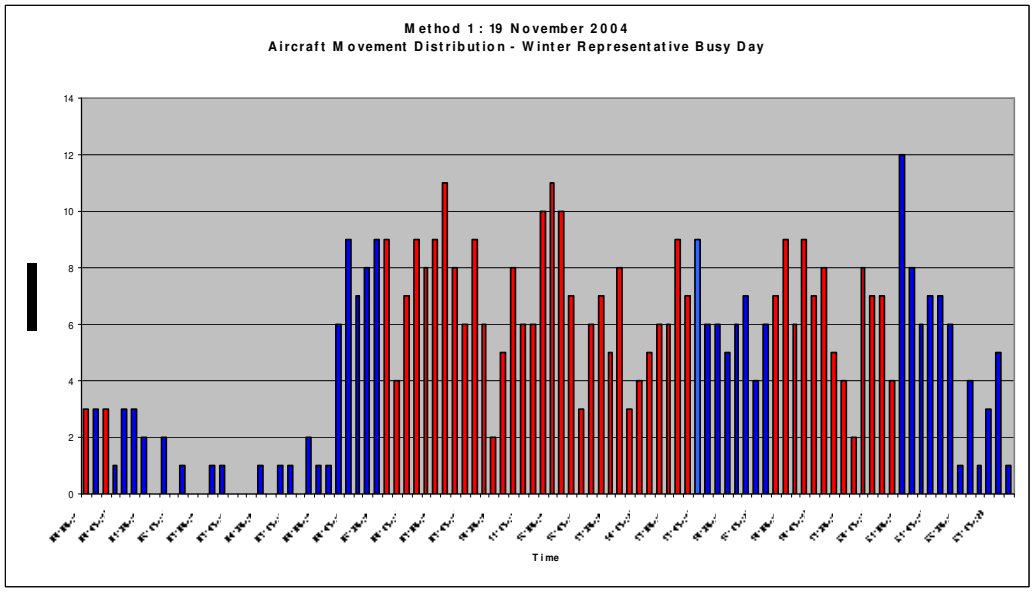
2004 traffic distributions for summer representative busy days chosen by M4 and M2.



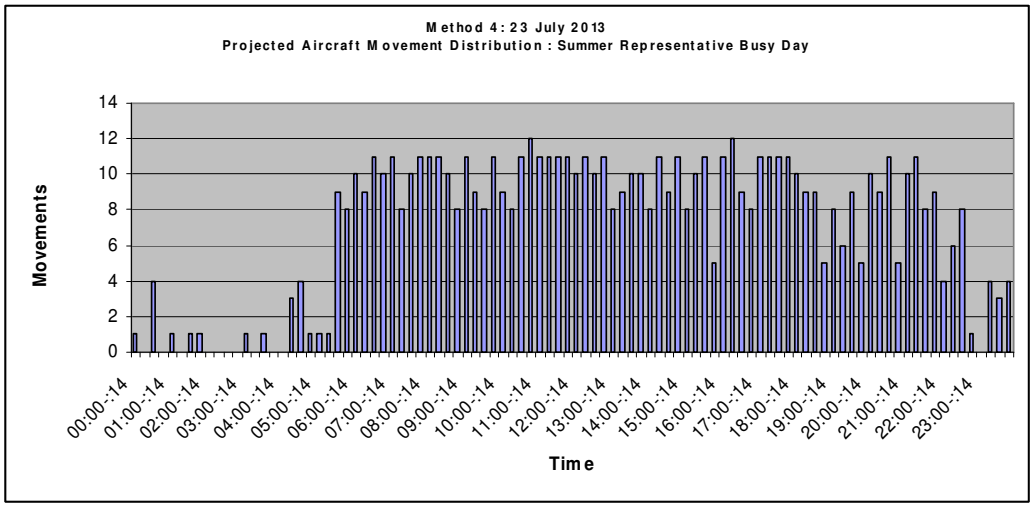


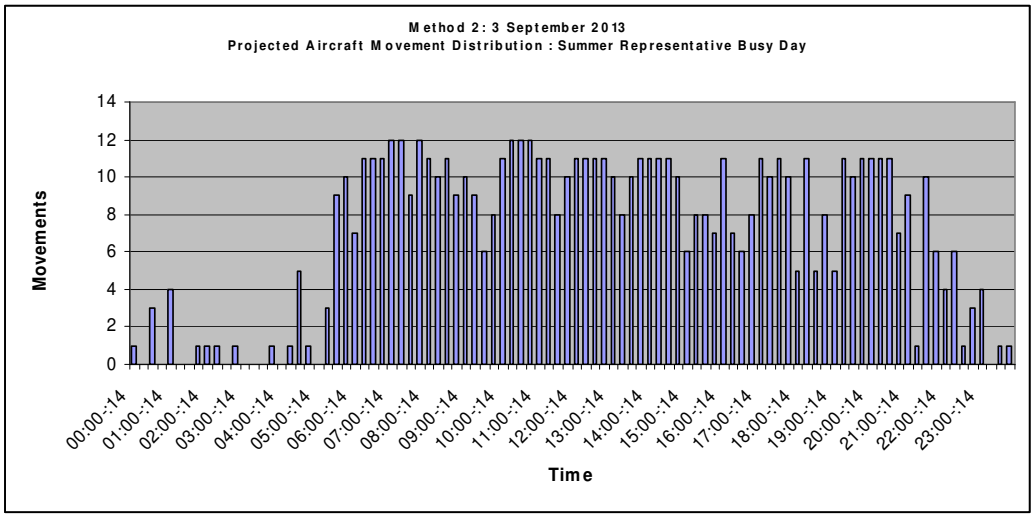
2004 traffic distributions for winter representative busy days chosen by M1 and M2.





2013 projected traffic distributions for summer representative busy days chosen by M4 and M2.





2013 projected traffic distributions for winter representative busy days chosen by M1 and M2.