Draft Proposal for the Amendment of the Sub-Cap on Off-Peak Landing & Take Off Charges at Dublin Airport

Addendum to Commission Paper CP4/2003

26th November 2003

Commission for Aviation Regulation
3rd Floor, Alexandra House
Earlsfort Terrace
Dublin 2
Ireland

Tel: +353 1 6611700
Fax: +353 1 6611269

E-mail info@aviationreg.ie

TABLE OF CONTENTS

1. INTRODUCTION

Section 6, pp.25-26 of CP4/2003 set out the Commission's reasons for its intention to review the sub-cap on off-peak landing and take off charges at Dublin Airport. Since the publication of that document, the Commission has developed a proposal for the amendment of the sub-cap. The purpose of this Addendum is to set out the details of that proposal and to seek representations on it from interested parties and the public.

The Commission allowed a consultation period of one month for the making of representations on CP4/2003, with a closing date of 5pm on Monday 8 December. In order to co-ordinate, in so far as practicable, the receipt of representations on the proposal herein with those on CP4/2003, the Commission would welcome the receipt of representations on this proposal on or before 5pm on Friday 12th December 2003. However, if required, this timeframe can be extended.

2. BACKGROUND TO THE OFF-PEAK SUB-CAP

The Commission is of the view that charges for the use of airport infrastructure should reflect the economic cost of use and distinguish between peak and off-peak periods. In accordance with this approach the Commission has calculated the damage costs of runway use and considers that these costs should form the basis of a sub-cap on off-peak landing and take-off charges at Dublin Airport. Specifically, aircraft causing equivalent damage to runway (taxiway and apron) pavements should attract the same landing or take off charge.

The Commission adopted Aircraft Classification Numbers (ACNs) as the appropriate method of measuring the damage to pavements by different aircraft types. Each aircraft type has a unique ACN, which can be translated into a marginal damage cost (per aircraft movement) through the application of the 4th Power Law for Pavements. If that marginal damage cost for a specific aircraft type (i) can be denoted C_i, then

$$C_i = (ACN_i/ACN_d)^4.C_d$$

where ACN_d is the Aircraft Classification Number and C_d is the marginal damage cost of a chosen "design" aircraft.[1]

The optimal charging basis would, therefore, have been to set a charge per movement (landing or take off) for each aircraft type i equal to its pure ACN-related marginal damage cost as defined above. However, landing (or movement) charges have traditionally been based on the weight of aircraft (declared through a bi-annual certification system) and, to reflect this, the Commission decided to adjust the ACN approach so that the schedule of charges (derived from the aircraft's ACN related damage costs) was expressed in terms of the aircraft's operational weight.

[1] If the damage inflicted on airport pavements by an aircraft (of type i) can be measured by its ACN, then relative damage can be expressed as the ratio (raised to the fourth power) of aircraft type i's ACN to the ACN of a chosen "design" aircraft. Therefore,

$$D_i = (ACN_i/ACN_d)^4$$

can be thought of as aircraft type i's relative damage rate and a single movement of that aircraft type is equivalent (in damage terms) to the proportion D_i of a single movement of the design aircraft. That implies, if C_d is the cost per movement of the "design" aircraft, then, by definition, the cost per landing of aircraft type i is the proportion D_i of C_d.

3. EXISTING METHODOLOGY & RESULTING ANOMALIES

The administrative issues above meant that, for the purposes of the 2001 Determination, it was necessary to move away from aircraft-specific pure ACN-related damage costs. The solution was to determine damage-based per tonne charges for each of 5 categories of aircraft in order to preserve a traditional weight-related element in the charging formula. The basic idea was that if, for example, Aircraft A and Aircraft B were equally damaging, but Aircraft A was heavier, the latter would be assigned to a category with a lower per tonne charge than Aircraft B. This would result in equal charges per movement.

This method, however, resulted in anomalies relating to certain aircraft types. In particular, the resulting movement charges[2] for more damaging aircraft turned out to be higher (in certain cases) than charges for less damaging aircraft. Airbus SAS (in raising the possibility of resulting adverse discrimination against its own aircraft relative to Boeing's) provided the example of the A319 and the B737-700.

[2] Under the current system, the charge per movement for each aircraft type is equal to the appropriate per tonne category charge multiplied by the certified weight of the aircraft.

4. TWO-YEAR REVIEW –VS- NEXT DETERMINATION

In principle, the Commission's preference would be to adopt charges based directly on an aircraft's ACN. However, the Commission is mindful of the fact that such a radical change may not be appropriate in the context of the two-year review. However, the Commission does wish to see the development of such a system over the longer term such that, for the purposes of the next Determination, it is in a position to implement the optimal charging basis. The Commission is willing to work with and would encourage co-operation between the airport operator, airlines and aircraft manufacturers in order to put such a system in place. The Commission also notes that, in order to ensure a level playing field, a common methodology and set of assumptions for the calculation of ACN values would need to be agreed by the industry or specified by the regulator.

For the purposes of the two-year review, it is left to the Commission to appropriately refine the existing approach such as to eliminate the anomalies described above. One option is to continue with a (refined) set of damage-based per tonne charges for aircraft categories. However, after extensive analysis, the Commission has found it to be impossible to eliminate these anomalies. In other words, continuing with a system of per tonne charges results in:

- Equally damaging aircraft paying different charges per movement; and
- Less damaging aircraft paying higher charges per movement than more damaging aircraft.

The Commission, therefore, proposes to move away from specifying damage-based per tonne charges to a system of damage-based per movement charges for 8 (rather than the existing 5) categories of aircraft, which has the effect of eliminating these anomalies.

However, before setting out the Commission's proposal and the methodology used, it is necessary to consider new information available to and used by the Commission for the purposes of developing the proposal.

5. NEW DATA

The proposals for a revised set of charges and corresponding classification of aircraft for the purposes of the sub-cap on off-peak landings and take offs at Dublin Airport are based on the following new information:

a. Calendar year 2002 aircraft mix for scheduled, charter and cargo operations, which replaces the calendar year 2000 mix for scheduled and charter operations;
b. Airline fleet information provided by Aer Lingus, British Midland and Ryanair;
c. As a result of 1) and 2), a revised set of Aircraft Classification Numbers (ACNs) that have a more universally agreed basis and that better reflect the operating characteristics of aircraft using Dublin airport.

5.1. 2002 Aircraft Mix

Approximately 1750 different aircraft used Dublin airport during calendar year 2002 and, for each, the following information was supplied by Aer Rianta:

- Aircraft type (manufacturer code);
- A corresponding ICAO code;
- A corresponding IATA code;
- The number of movements; and
- The average billed operating weight per movement.

Using the new ICAO coding system, the information above was aggregated to give 113 aircraft types, which account for 163,763 scheduled, charter and cargo landings and take offs (aircraft movements). The most heavily used aircraft type was the Boeing 737-200, with 34,262 movements, a share of approx 21%. The next most

heavily used types were, respectively, the A321 (15,326), the BAE146-30 (14,758), the B737-500 (13,482) and the A320 (11,845).

For each aircraft type, a representative operating weight was calculated as a weighted average of the average billed operating weights of the individual registered aircraft of that type. These representative operating weights were, in turn, used for the purposes of calculating a revised set of ACN values as well as for the revised set of charges proposed below.

5.2. Airline Fleet Information

Current fleet information was supplied by Aer Lingus, British Midland and Ryanair. This information consists, for each aircraft type in the fleet, the Maximum Take Off Weight (MTOW), the current operating weight, tyre pressures (for nose and main wheels) and, in the case of Aer Lingus, details of landing gear configurations. British Midland supplied information for each of its registered aircraft using Dublin airport. Aer Lingus supplied analogous information for its Boeing and British Aerospace fleets but not for its Airbus fleet.

The following table shows the aircraft types in each of the three airlines current fleets operating from Dublin:

Aer Lingus	British Midland	Ryanair
A320-200	A320-200	B737-200
A321-200	A321-200	B737-800
A330-200	A330-200	
A330-300	B737-300	
B737-400	B737-500	
B737-500	F100	
BAE 146-300	EMB135	
	EMB145	

Note that the most heavily used aircraft type in the 2002 mix (the B737-200) is used only by Ryanair, while the next most heavily used

types are used by Aer Lingus and British Midland. In each case, these airlines account for the bulk of the movements of these aircraft types, as detailed in the previous section.

As outlined in CP4/2003, the Commission would welcome fleet information from any airline operating at Dublin Airport and would endeavour to make appropriate adjustments to its proposal on that basis.

5.3. Revised Aircraft Classification Numbers (ACNs)

Transport Canada has calculated and published ACN values for a wide range of aircraft. Pavement Management Systems (PMS) has checked a significant number of its calculations against published ICAO values and values available from other sources. PMS is satisfied that Transport Canada is carrying out the calculations in accordance with ICAO specified methods.

ACNs are calculated for rigid pavements with a C (low) sub grade strength. This is consistent with the original Determination. Given these assumptions on the pavement characteristics at Dublin airport, ACNs are a function of the following characteristics of the aircraft for which the ACN is being calculated:

- Aircraft weight;
- Tyre pressure;
- Landing gear.

The Commission is of the view that ACNs calculated on the basis of an aircraft's operating weight (where this is different to its MTOW) would better reflect the load being imposed on pavements by a landing of that aircraft, which, in turn, leads to more cost-reflective charges. Therefore, the Commission requested PMS to determine ACNs for each

aircraft type based on the average (billed) weight per movement in 2002 as supplied by the airport operator. This, in turn, reflects the operating weight as twice yearly declared by the operating airline.

This plus the tyre pressure information submitted by Aer Lingus, British Midland and Ryanair was used to select the appropriate aircraft type entry in the Transport Canada ACN schedule. Where tyre pressure information was not available and there was more than one candidate set of values in the Transport Canada schedule, the higher tyre pressure option was selected to give a conservative estimate of CAN.

By examining (for each aircraft type) the tyre pressure, maximum MTOW, minimum MTOW, maximum ACN (corresponding to max MTOW) and minimum ACN (corresponding to min MTOW), it was possible to interpolate the appropriate ACN based on the aircraft's average operating weight (as supplied by the airport operator).

Differences between ACNs calculated in 2003 and those used in 2001 are, in general, explained by different aircraft weights used in the calculations. However, there are three aircraft types that show significantly higher ACNs in 2003 compared to 2001, without a significant change in aircraft weights. These are the B747-200, the Fokker 50 and BAERJ85. The differences are primarily attributable to differences in the assumed tyre pressures. One aircraft type, the AN12 shows a significantly lower ACN in 2003, again attributable to a much higher pressure used in 2001.

5.4. Inflation & Total Damage Costs

For the purposes of the original Determination and as outlined in Appendix VIII to CP8/2001, total damage costs were estimated as the sum of expenditures on the "routine" repair and maintenance and on the structural repair of pavements.

"Routine" repair and maintenance expenditures were taken as the sum of expenditures on associated external services and materials, as well as labour from the 2000 Aer Rianta General Ledger. Structural damage costs were estimated by the annualised cost of Aer Rianta's planned airfield upgrade projects over the 10 years to 2010. Routine expenditures were inflated for two periods:

a. 1st January 2001 to 30th September 2001; and

b. 1st October 2001 to 30th September 2002.

Because the Determination allows for the inflation of charges at the end of each regulatory year, the second period above was the first regulatory year. Consequently, the second of these was an error.

Revised caps will apply from 1 January 2004. Therefore, to maintain consistency with the Determination, the total damage cost base used in 2001 was inflated as follows:

a. For the balance between the estimate used for the period 1st October 2001 and 30th September 2002 and the outturn, that is, 4.21% - 3% =1.21%;

b. For the period 1st October 2002 to 30th September 2003, that is, 3.1%;

c. An estimate for the period 1st October 2003 to 30th December 2003, that is, one quarter of 3% = 0.75%.

6 PROPOSAL FOR TWO-YEAR REVIEW

6.1 Methodology

The method used to convert the information above into a set of charges and aircraft classifications can be described by a number of steps.

Step 1: Calculation of benchmark damage cost inflicted by the Design Aircraft.

The "design" aircraft was given an ACN of 65. The corresponding damage cost per movement of this aircraft (C_d) was calculated as €195.[3]

Step 2: Calculation of damage rates for each aircraft type in the 2002 mix

The formula for an aircraft's damage rate (D_i) is given in footnote 1. An aircraft's damage rate is either greater than or less than 1 according to whether its ACN is greater than or less than 65. If it is greater than one, the aircraft's cost per movement is greater than €195. If it is less than one, the aircraft's cost per movement is less than €195.

Step 3: Choice of revised and simplified aircraft categories

Aircraft were categorised by defining a distinct range of ACN values for each aircraft category as follows:

---

[3] Based on new ICAO codes, the calendar year 2002 aircraft mix for scheduled, charter and cargo operations consisted of 113 aircraft types. The total number of landings and take offs was 163,763. Denote this as the sum over all aircraft types of the landings and take offs (L) of each aircraft type (i), that is, $\Sigma_i L_i$. From footnote 1, the total number of landings of a particular aircraft type i can be expressed as an equivalent number of landings of the design aircraft $D_i L_i$. The sum over all i, $\Sigma_i (D_i.L_i)$ = 37,117. In other words, 163,763 movements of the aircraft in the 2002 mix is equivalent in damage terms to 37,117 movements of the design aircraft. Dividing total damage costs by these total equivalent movements gives the cost per movement of the design aircraft C_d.

Aircraft Category	ACN Range
1	0-30
2	31-40
3	41-50
4	51-60
5	61-65
6	66-70
7	71-80
8	>= 81

The size of these ACN ranges, like all matters in this paper, forms the basis of a proposal and is open for discussion among interested parties.

Step 4: Calculation of average damage rates and charges for each category

Average damage rates for categories (D_j) were calculated as a weighted average of the individual damage rates of the subset of aircraft types belonging to the category. The formula is given by the following:

$$D_j = \sum_{i \in j} (D_i.L_i) / \sum_{i \in j} (L_i)$$

where $\sum_{i \in j}$ denotes the sum over the subset of aircraft types i that are an element of category j. The result was 8 average damage rates expressing the proportion of the benchmark cost of the design aircraft that are appropriate to the categories. Per movement charges were given for each category as the product of the relevant category damage rate and the cost per movement of the design aircraft.

6.2 Outcome

The resulting per movement charges for each of the 8 aircraft categories are:

Proposed Movement Charges

Aircraft Category	ACN Range	Charge per Movement
1	0-30	€2.52
2	31-40	€17.82
3	41-50	€51.31
4	51-60	€119.46
5	61-65	€183.49
6	66-70	€228.69
7	71-80	€318.52
8	>= 81	€556.50

with a revised aircraft classification as follows:

Proposed Classification of 2002 Aircraft Mix

Category 1					Category 2
AN12	BAE748, HS748	CL600, CL65, CRJ/-100	EMB145	PA23	B737-200
AN24	BAERJ85	CL604	F100, FK100	PA28	B737-500
AN26	BE19	CRJ	F27, FK27	PA31	B737-600
AN72	BE20	CVLT	F50, FK50	PA34	B757-200
ATP	BE9	D328	F70, FK70	PN68	BA11530
ATR42	BN2	DC3	F900	SAAB2000, SB20	C130, L382
ATR72	C172	DC6	FA3, SW3	SAAB340B, SF34	IL76
B190	C208	DH8, DHC8	G4	SH33	L188
B222	C404	DHC8311	JS31	SH36	R100
BA41	C406	DO82	LJ45	SK76	RJ100
BAE146, RJ	C421	E110, EMB110	LR55	SW4, SWM	TU154
BAE14620	C500	EMB135	LR60	TU134	
BAE14630	C550				
Category 3	**Category 4**	**Category 5**	**Category 6**	**Category 7**	**Category 8**
A319	A310	A330	A300, -600	A330-200	B767-400
A320	A321	A330-301	A300B4	A340	B777
B737-300	B727100	DC10	B747	B747-200	B777-200
B737-400	B727200		B767	B747-300	MD11
B737-700	B747SP		B767-300	B747-400	
B737-800	B767-200		DC8	L1011	
B757	MD83				
B757-300					
DC9					
MD80, -81					
MD82					
MD87					
MD88					
MD90					

6.3 Analysis

The following table shows, for all Airbus and Boeing aircraft using Dublin Airport, the aircraft's ACN, the aircraft category to which it belongs and the corresponding charge per movement under the proposal above. The table indicates that charges are unambiguously increasing in line with ACNs and this is the case for all aircraft types in the 2002 mix. Therefore, the anomalies associated with the existing charges and aircraft classification are eliminated.

Outcome of Proposal for all Airbus and Boeing Aircraft

AIRCRAFT TYPE	ACN	New Aircraft Category	New Charge per Movement
A319	44	3	€51.31
A320	48	3	€51.31
A321	58	4	€119.46
A310	59	4	€119.46
A330-301	64	5	€183.49
A330	65	5	€183.49
A300B4	66	6	€228.69
A300, -600	68	6	€228.69
A340	71	7	€318.52
A330-200	73	7	€318.52
B737-200	35	2	€17.82
B737-500	37	2	€17.82
B737-600	40	2	€17.82
B757-200	40	2	€17.82
B757-300	43	3	€51.31
B737-300	43	3	€51.31
B737-400	45	3	€51.31
B757	45	3	€51.31
B737-800	46	3	€51.31
B737-700	47	3	€51.31
B727100	51	4	€119.46
B727200	56	4	€119.46
B747SP	58	4	€119.46
B767-200	58	4	€119.46
B767	69	6	€228.69
B747	70	6	€228.69
B767-300	70	6	€228.69
B747-200	71	7	€318.52
B747-300	71	7	€318.52
B747-400	76	7	€318.52
B767-400	81	8	€556.50
B777	88	8	€556.50
B777-200	88	8	€556.50