Commission for Aviation Regulation

Dublin Airport Capacity Study

Final Report

July 2004

Alan Stratford & Associates

Contents

Executive Summary

i) This study is undertaken by Alan Stratford and Associates Limited in conjunction with the Air Transport Group at Cranfield University. Undertaken on behalf of the Commission for Aviation Regulation (CAR), it provides an independent assessment of capacity at Dublin Airport and offers preliminary recommendations on whether the airport should continue under a system of voluntary slot coordination (schedules facilitation) or should move to full slot coordination. The evaluation and recommendations cover a three year time horizon to 2007.

ii) In accordance with the Terms of Reference (see Appendix D), the study includes a airport capacity assessment, a consultation exercise with stakeholders, a review of terminal and aeronautical infrastructure to assess whether and how current and future traffic demand might be met and a review of its current coordination status. It concludes with our recommendations in relation to the airport's future coordination status and timescales for such designation.

iii) Building on a range of previous studies, our analysis covers all aspects of airport capacity including kerbside access, the passenger terminal, the runway(s), taxiways and apron system and aircraft stands. The assessment excludes the possibility of adding a new pier to the existing terminal or the construction of an additional passenger terminal or a second runway or an additional pier to the existing terminal as these options are outside the time horizons of the study brief. It should be noted that, were these facilities be available, they would add capacity at the airport and would diminish any argument for full coordination.

iv) The traffic forecasts for Dublin Airport prepared by Aer Rianta suggest that under the 'Centreline Case', passenger traffic will rise from projected 16.6 mppa in 2004 to 21.1 mppa by 2008. This represents an average growth rate of 6.2 percent per annum. Aircraft movements are expected to rise at a lower rate due to increasing aircraft loads and a reduction in the number of general and corporate aircraft flights. The Aer Rianta forecasts, however, suggest a higher growth rate for transatlantic and other European routes in comparison to domestic and UK markets.

v) Runway capacity at Dublin was assessed in a study undertaken by National Air Traffic Services (NATS) in 2003. The maximum hourly capacity of the main runway (Runway 28) is 44 movements per hour applied for two separate hourly periods per day. Within this, there is a further constraint of a maximum of 12 movements in any quarter hour period. The capacity for Runway 10 is similar to Runway 24 less five daily movements. According to NATS, the additional use of the cross-runway (16/24) and the shorter near-parallel runway 11/29 does not add any extra movement capacity.

vi) In principle, all airports with a single runway with similar infrastructure (eg rapid exit taxiways) should have similar hourly capacities. Gatwick is generally regarded as 'best in class' in this aspect. Any differences between Dublin and Gatwick are largely due to infrastructure

differences, traffic mix and operational procedures. In addition, the calculation of Gatwick's capacity is modelled on a 10 minute average delay criteria, whilst Dublin is based an 8 minute average delay. There is, however, no desire amongst airlines to move to a less stringent criteria in order to increase movement capacity.

vii) We understand that the Runway Capacity Group at Dublin Airport is actively seeking methods to increase runway capacity. Some minor operational benefits will become available through the use of the cross-runway 16/34 and as a result of the re-opening of the shorter Runway 11/29. As a result of these and other minor improvements, Aer Rianta are targeting an increase of one additional aircraft movement per hour in 2005, and this process is expected to continue in future years. Whilst this could potentially increase passenger throughput, it should be noted that existing terminal capacity scheduling constraints may still apply.

viii) We have assessed the capacity of the passenger terminal at Dublin Airport by evaluating the individual spatial areas and processing facilities. Under a parametric approach based on typical passenger service times, dwell times and space standards per passenger, we estimate that the capacity is around 18-22 mppa. This is based largely on the 'weakest links', which we feel are the landside departure concourse and gate lounge capacities, and the flexibility of these areas to adapt to specific spatial standards per passenger. In the former case, there are particular operational factors as the circulation space in the departure concourse often overspills with passengers queuing for check-in. In our view, this is largely under the operational control of the airlines and handling agents (in terms of the numbers of desk open) and Aer Rianta in terms of the marshalling of passengers and spatial control.

ix) Whilst overall passenger dwell times at Dublin (as at many other European airports) are tending to increase, putting pressure on all areas in terms of spatial standards per passenger, we do not believe that the airport has, or will have an unacceptable level of congestion, provided the current terminal scheduling constraints are retained and airlines maintain their current acceptance rates of flight time changes proposed by the Schedules Coordinator.

x) In terms of stand availability, there is no shortage of contact stands with the vast majority of aircraft operations having access to these stands and with a comparatively low level of remote stand use except during summer weekends. The only major constraint is the shortage of contact stands for overnight parking and for some long-haul operations with increased turnround times. The usage of contact stands is higher at Dublin than almost all other European airports so we feel that carriers should accept that, on certain occasions and time periods, it may be necessary to use a remote stand. We recognise that this does put some operational and financial pressure on airlines and ground handlers in terms of the availability of airside buses and we would recommend that Aer Rianta should investigate whether a single independent supplier of airside bus transport might be established to improve efficiency in this area.

xi) The study has involved extensive consultation with the key stakeholders including Aer Rianta, the key airlines and ground handlers operating at Dublin, the Irish Department of Transport and the Air Passenger Users Council. Although Aer Rianta have requested that the airport should be designated as coordinated, this view is not supported by the two main home based carriers who handle 64 percent of all Dublin's traffic. Although some ground handlers and a small number of other airlines have indicated that they are in favour of coordination, these represent less than 20 percent of all traffic handled.

xii) The process of slot coordination (or schedules facilitation) is designed to ensure that airports can operate safety and without excessive congestion levels. It can also be used to protect the rights of new airline entrants wishes to operate to and from particular airports. The flight schedules at the majority of the larger European airports are fully coordinated by an independent organisation.

xiii) Dublin has been functioning as a coordinated (rather than fully coordinated) airport since September 2000. At this date, Airports Coordination Ltd (ACL) was appointed to coordinate schedules facilitation at Dublin Airport. In managing airline schedule requests, the Coordinator seeks to achieve voluntary adjustments to schedules in order to achieve a more balanced distribution of daily departures and arrivals within defined terminal, stand and runway constraints. This is achieved through encouraging air carriers to re-schedule some departures and arrivals away from peak periods, hence reducing congestion and the probability of carriers incurring delays.

xiv) The current system involves schedules coordination under certain criteria, including maximum hourly and quarter hourly aircraft movement limits and assumed hourly terminal passenger flow limits (3,250 departure and 3,000 arrivals passengers per hour) based on peak load factor estimates of 90% for scheduled and 100% for charter services. A further constraint of 8,000 departure passengers in any three hour period is also applied. It should be noted that, analysis of the 'busy hour' passenger flow rate in 2003 (based on the BAA defined 'Busy Hour Rate') shows that achieved flow rates are well below these figures, suggesting that the assumed load factors in this constraint may be too high.

xv) In general, the current system of (voluntary) coordination appears to be operable and we recommend that it continues in place for the next three years. This conclusion is based on our assessment that there is sufficient terminal and aeronautical capacity, provided that this is managed appropriately. This is also the view of the majority of airlines, although we accept that Aer Rianta takes a different standpoint.

xvi) We do, however, recognise that the airline market can sometimes be unpredictable and we therefore further recommend that annual reviews are undertaken to evaluate the operability of the coordination system over the previous 12 months, particularly in relation to two possible scenarios. The first scenario is the possible effect of an increase in transatlantic flights from Dublin following the potential relaxation of the

Shannon stopover under the US-Eire bilateral. Dependent on the timings of any possible new flights, we believe that there could be significant constraints on particular airport facilities, particularly at weekends in the Summer season. However, we feel that these can mostly be overcome, eg by appropriate scheduling constraints by limiting the number of transatlantic flights over given time periods. If absolutely necessary, these flights could be handled through the use of remote rather than contact stands, through changes in the check-in islands used for transatlantic flights and possibly by diverting passengers to US-based Immigration facilities rather than using the Dublin-based INS facility.

xvii) The second scenario concerns the level of refusals to flight changes requested by the Coordinator. Our analysis of the scale and pattern of refused adjustments suggests that certain air carriers have not been particularly cooperative with the Coordinator. The existing system allows air carriers to exercise a significant degree of flexibility in scheduling which would otherwise not be possible under the status of full coordination. Should there be a significant increase in the scale of refusals then this may compromise the efficiency of existing arrangements leading to a possible change of status in the future.

1 Introduction

This report has been prepared by Alan Stratford and Associates Ltd in conjunction with the Air Transport Group at the University of Cranfield. Undertaken on behalf of the Commission for Aviation Regulation (CAR), it provides an in-depth study of the level of capacity at Dublin Airport in light of the European Commission's Slot Allocation Regulation 95/93[1]. The study was undertaken following a request by the airport authority, Aer Rianta, in accordance with Article 3 of the Regulation. The report was prepared on an independent basis, with the CAR acting in a facilitatory role only.

At present, Dublin is designated as a Coordinated Airport (Level 2) as classified by IATA (International Air Transport Association). Under this designation, all scheduled flight movements are allocated to specific departure and arrival time slots by an independent coordinator under certain rules and constraints. This process is undertaken on a cyclical basis over each Winter and Summer season. Airlines provide a list of their preferred flight arrival and departure slots to the coordinator some five months in advance of the start of each season. The coordinator will allocate slots under specific rules for both runway and terminal capacity. It is accepted practice that airlines maintain slots held for the same timings in a previous equivalent scheduling period. Where possible, all other flight movements are then allocated to their originally requested time or are changed to new times which are mutually acceptable to the airlines. Under this process, a proportion of flight movements will remain unallocated (known as 'refused moves') and, under the current voluntary system, the airline may go ahead and operate these at their preferred times irrespective of whether they meet the scheduling constraints. Separate procedures apply to general aviation flight movements where prior permission is required. General aviation accounted for some 5.5 percent of total traffic in 2003 and the prior permission process is managed by the Airport Duty Manager.

The study will assist the Commission in their decision as to whether Dublin Airport should remain as a Coordinated Airport (Level 2) or whether it should be designated as Fully Coordinated Airport (Level 1). In the latter case, all flight movements are scheduled by the Coordinator or by mutual agreement with the airline. There is no scope for refusal of changes of flight times and the Coordinator has the power to take legal action against any airline operating outside these arrangements.

The study assesses the capacity and the need for full or voluntary coordination over the next three years. Our recommendation for a three year time period is based on the expected traffic growth over this period in relation to assessed capacity and future infrastructure requirements. Although significant capacity improvements may be introduced at the airport in the medium to long-term, notably a second passenger terminal, a second runway and an additional pier to the existing terminal, these would not be operational within this three year time horizon and they have therefore been discounted from the analysis.

[1] Council Regulation (EEC) No 95/93 of 18 January 1993 on common rules for the allocation of slots at Community airports

A key aspect of the study is the need to review the capacity of the airport and the scheduling constraints in the light of expected traffic growth and the level of cooperation of the airlines both in agreeing to possible scheduling changes and in operating procedures at the airport. The capacity assessment itself will look at the level of passenger throughput and aircraft movements possible both within the current airport terminal, runway and apron infrastructure and as result of any possible infrastructure improvements over the next three years. Although Aer Rianta have prepared a possible Capital Improvement Programme (CIP) for 2003-2006, these are proposals for consultation only, rather than a finalised programme.

Our study has involved an extensive consultation exercise with major stakeholders involving both personal interviews and a questionnaire which was e-mailed to all members of the Airport Operators Committee (AOC) – see Appendices B and C. The AOC was selected as the most appropriate method of distribution as all the major airlines and handling agents at Dublin are represented. AOC members were also sent e-mails with a link to a downloadable copy of the Draft Report on which they were invited to comment. To provide a wider circulation of the Draft Report, an advertisement was placed in the 'Irish Times' which provided details of how this could be obtained and invited comment. We believe that the consultation process has been as extensive as possible within the time constraints of the study itself.

The study makes use of several terminal and runway capacity analyses undertaken at Dublin Airport in the past few years. Halcrow undertook studies in 1996 and 1998[2], Airport Coordination Ltd (ACL) in 1999[3], SH&E in February 2001[4] and most recently the PM Team comprising Project Management Ltd., Skidmore, Owings and Merrill and TPS Consult undertook a parametric study of terminal capacity based on the extension of the terminal undertaken between 1999 and 2001[5].

We have evaluated all these reports and because of the short time scale of this present study we have used much of the basic data available in the PM/TPS report supplemented by more recent survey and other information provided by Aer Rianta as the basis of our own study.

[2] 'Dublin Airport Capacity Studies, Halcrow, 1996 & 1998

[3] 'Dublin Airport: Demand and Capacity Study, Airport Coordination Ltd, July 1999

[4] 'Assessment of Capacity of Dublin Airport', SH&E Ltd, February 2001

[5] 'Dublin Airport Terminal and Pier Development Studies: Capacity and Functionality Baseline Report', PM/TPS Consult Issue E – June 2003 and Issue F – September 2003

2 Slot coordination

2.1 Legal framework

The legal framework for coordination of slots at airports in the European Union is governed by Regulation 95/93[6], which came into effect in 1993. Several provisions in this regulation were subsequently amended in April 2004 under Regulation 793/2004. These amendments will come into effect on July 30, 2004. The rules governing the process of slot allocation are largely based on guidelines that have been established by IATA since the 1960s in allocating scarce airport capacity.

Regulation 95/93 defines the coordination status of airports as either fully coordinated or coordinated [7]. Although there are changes to terminology in the amended Regulation, for the purposes of this report, the terms fully coordinated and coordinated will be used.

Under the legislation, regulators responsible for slot allocation in each member state have the power to designate an airport as being fully coordinated. Airlines representing over 50% of the operations at an airport, the managing airport authority or the European Commission can request that a capacity analysis be undertaken for the purposes of determining whether full coordination is necessary. The regulator can also undertake a capacity analysis without the need of a written request from the aforementioned parties.

The rules governing allocation and use of slots come into effect once the airport has been designated as fully coordinated. If the airport remains coordinated, then normal voluntary re-scheduling procedures remain in place.

The first step is for the national regulator (e.g. Commission for Aviation Regulation) to appoint a coordinator at the fully coordinated airport. The coordinator's function is to manage the process of slot coordination at the airport level in a manner that is transparent, non-discriminatory and neutral. The functions of the coordinator also include collating and disseminating schedules data, monitoring the use of slots, advising air carriers on scheduling issues, allocating slots to air carriers, liaising with other interested parties such as air traffic control and the airport managing authority and attending the bi-annual world wide IATA scheduling conferences. It should be noted that at coordinated airports such as Dublin, and for example Birmingham and Glasgow in the UK, a slot coordinator manages voluntary re-scheduling of air transport movements. However, under the status of full coordination, the coordinator assumes additional responsibilities (e.g. administration of slot pool, enforcement and monitoring).

At each fully coordinated airport the regulation requires that there is a coordination committee established which represents the airlines, general aviation users, airport managing authority and air traffic control. The committee advises the coordinator in a number of key areas such as monitoring of slot usage, possibilities for increasing capacity, problems for new

[6] Refer to Footnote 1.

[7] Both terms correspond to IATA definitions level 3 and level 2 respectively.

entrants, local allocation guidelines and other operational issues. Although not fully coordinated, a Coordination Committee already functions at Dublin which includes representatives of Aer Rianta, the IAA, ACL, air carriers, general aviation interests and observers from the Commission for Aviation Regulation.

At fully coordinated airports, air carriers are entitled to use the same slots that were held in the previous equivalent season (historic precedence) provided that the carriers can demonstrate to the coordinator that the slots have been used for at least 80% of the time in the previous equivalent season. Where the requests of several carriers cannot be satisfied, priority is given to the carrier that proposes to use the slots on scheduled or programmed charter flights and year-round operations. At present, under coordinated status, historic precedence and the 'use it or lose it' rule are not applied at Dublin.

Provisions also exist to facilitate competition through assisting new entrant airlines. There are three different types of new entrant airline defined in the Regulation. These are:

- Those carriers holding less than five slots at an airport on a particular day; or

- An airline requesting slots for a use on an intra-EU route (between two airports or airport systems) where there are two incumbent airlines already operating where if accepted the air carrier would hold fewer than five slots at the airport on a specific day for the non-stop service; or

- An airline requesting slots for a service to a regional airport where there are no other scheduled services from the same airport or other airports in the same system where if the airline's requests were accepted it would hold less than five slots at that airport on a specific day for that non-stop service.

Airlines holding greater than 5% of slots at an airport or 4% of slots in an airport system, are not considered as new entrant airlines under the provisions of the regulation.

In the process of allocation, slots can be exchanged between carriers (one for one), between different routes or types of services by the same carrier and between parent and subsidiary airlines provided all of these have been cleared by the coordinator. New entrants are prevented from changing the use of their slots to another route for two equivalent scheduling seasons.

The regulation also has guidelines for the distribution of newly created, unwanted, and confiscated slots, which are all, organised in a slot pool. Half of the slot pool for each season is first offered to new entrants. New entrants loose their status as new entrant carriers if they refuse slots offered within one hour before and after the requested time for that scheduling season.

One of the most significant changes to the original Council Regulation 95/93 are the new enforcement provisions laid out in Article 14 of the amended regulation. These grant coordinators additional powers to address issues of carrier abuses of the slot coordination system. This includes powers to

confiscate slots provisionally allocated to new entrant carriers who have failed to obtain an operating license by the start of the scheduling season. Similar powers apply to instances where carriers have not been using slots as intended and where carriers have been consistently using allocated slots at times significantly different from that originally intended.

A change in the coordination status of Dublin will have a number of important implications for the various stakeholders involved. The possession of slots with historic rights means that airlines will have a greater degree of certainty regarding their future operations at the Airport. On the other hand, full coordination will mean there will be less flexibility in scheduling flights compared to that allowed under existing arrangements. Full coordination will also mean that ACL's work requirements will increase quite substantially. This includes, for example, the requirement to determine historic slots, administer waiting lists and the slot pool, and monitoring the use of slots (i.e. "use it or lose it" rule). The airport operator should also benefit from full coordination in terms of being able to deliver higher standards of service and comfort to passengers. This is because under full coordination, the coordinator will have the legal authority to refuse slot requests at peak periods where there may be congestion and over-crowding in key sections of the terminal.

2.2 Process of slot coordination

The slot allocation system is managed internationally by IATA. The allocation of slots and worldwide coordination of schedules takes place bi-annually at two international conferences. Attended by airlines, coordinators and other interests parties, these events are convened to allocate slots for summer and winter scheduling seasons. The conferences are usually staged in November for the summer scheduling season, which starts at the end of March while the winter scheduling conference takes place in June for the start of the winter season at the end of October. The process of allocation is illustrated in Figure 2.1 below.

Preparation for each allocation begins seven months prior to the start of the season when airport coordinators determine which slots have historic precedence. This initial process is based on the actual slot usage experience of the previous equivalent scheduling season. For example, according to the IATA guidelines, slots held on file by coordinators at the slot return deadline dates for each season are used as the basis for the determination of historic slots for the following equivalent season. These historic slots are then communicated to each airline. The airline is then required to check the coordinators determination and communicate whether they have accepted or rejected the data and to resolve differences by the data submission deadline.

The next stage is the deadline for the submission of initial slot requests by airlines to coordinators. This deadline date is set at 27 days prior to the start of the conference. The term used is slot clearance requests (SCR). This includes historic slots, proposed changes to historic slots and new slots.

Six days prior to each conference, coordinators undertake a preliminary allocation, which outlines the status of airline slot clearance requests. This includes any changes required to meet capacity restrictions and if requests cannot be accommodated the nearest available slot is offered.

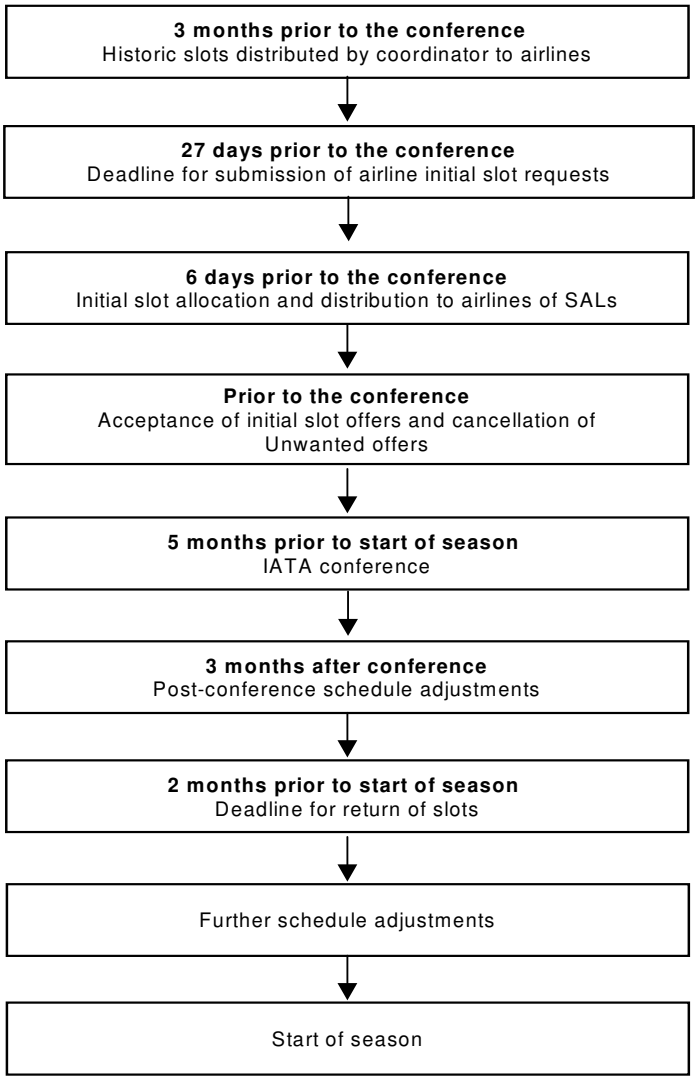
During the conference coordinators and airlines meet to discuss schedule adjustments required and to confirm any agreed changes.

For three months after the conference the coordinator must deal with possible further schedule adjustments. These include situations where airlines change their timetables after a conference and thereby are no longer in need of slots secured at the conference. In these circumstances, the coordinator holds a wait list of requests for individual slots. The deadline for returning unwanted slots to the coordinator is the end of January for the summer season and the end of August for the winter season. Further adjustments may take place leading up to the start of the scheduling season and during the season itself.

Under existing voluntary scheduling arrangements at Dublin, broadly the same timetable is followed in terms of preparation and planning for the relevant season. Because historic slots do not exist at Dublin, there is therefore no initial coordinator confirmation to the air carriers of their historic slots. However, most of the other deadlines and planning phases are actually followed. It is also pertinent to note that, although Dublin is currently coordinated, the airport has been managing voluntary scheduling with most of the administrative infrastructure associated with full coordination since ACL were appointed in 2000.

It should be noted that, since Dublin's designation as a coordinated airport, a number of processes have been adopted by Aer Rianta and the coordinator to 'fine-tune' capacity. These include the establishment of an Airport Coordination Committee, the derivation of 'flexing' options, the development of ad-hoc slot clearance and 'overage' procedures, the adoption of a Prior Permission Required process for General Aviation traffic and the formation of a Runway Enhancement Group. All of these measures, which are over and above the basic requirements of a coordinated airport, have contributed towards the improved management of existing capacity at the airport during the past four years.

Figure 2.1 Process of slot coordination



2.3 International comparisons

Table 2.1 provides details on the slot coordination status of airports in countries where EUACA[8] full members and associated members provide coordination services. With the exception of Dublin, Budapest, Malta and Warsaw, the national gateway airports of each country are currently functioning with the status of full coordination. Budapest, Malta and Warsaw are designated as coordinated. The largest number of fully coordinated airports are to be found in Greece and Spain where the capacities of the airports concerned are limited in relation to traffic volume. In Greece, many of the airports serve inclusive tour charter flights where demand is very high during the summer months and capacity is limited. In Italy, Portugal and Spain some airports are designated fully coordinated for the summer season

[8] European Union Airport Coordinators Association

only. There are seven such airports in Spain (Alemria, Gerona, Ibiza, Menorca, Reus, Seville, Valencia), two in Italy (Lampedusa, Pantelleria) and one in Portugal (Faro). No examples were identified of full coordination being applied for shorter time periods (e.g. day of week, time of day)

Table 2.1: Slot Coordination Status at EUACA full member and associate member states

State	Fully Coordinated		Coordinated
	All Year	Summer only	
Austria	1		5
Belgium	1		0
Czech Republic	1		0
Denmark	1		0
Finland	1		0
France	3		1
Hungary	0		1
Germany	7		10
Greece	31		0
Italy	11	2	2
Ireland	0		1
Malta	0		1
Netherlands	3		0
Norway	2		0
Poland	0		7
Portugal	3	1	0
Spain	11	7	4
Switzerland	2		0
United Kingdom	4		2

Source: EUACA members websites and IATA World Scheduling Guidelines 9th, Edition 2003

Dublin is the largest coordinated airport in Europe. Other airports of equivalent size such as Copenhagen, Dusseldorf, Milan Malpensa and Zurich are all designated by their national authorities as fully coordinated. Coordination status is not so much dependant on size but on the ability of capacity to meet demand hence the significant number of small coordinated airports in Greece. It is also the case that some airports were already designated as fully coordinated prior to when EC Regulation 95/93 came into effect. The Regulation requires there to be a thorough capacity analysis prior to any change in coordination status. However, the 2000 PWC review of the EU slot regulation highlights instances where other designation criteria appear to have been applied [9].

[9] *Study on certain aspects of Council Regulation 95/93 on common rules for the allocation of slots at Community airports for the European Commission.* May 2000, p18

3 Traffic growth and projected demand

3.1 Historic data

Dublin Airport handled some 15.9 million passengers and 177,783 aircraft movements in 2003, of which some 14,848 (8.4 percent) were accounted for by general and corporate aviation. Passenger traffic is expected to increase by about 4.8 percent to 16.6 million in 2004, whilst aircraft movements are predicted to fall to about 173,900 representing a decline of about 2.2 percent. The historic trends in traffic over the period 2001-2003 are summarised in Table 3.1.

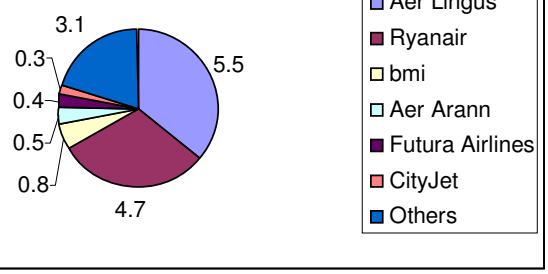
Table 3.1 Dublin Airport – Passengers and Aircraft Movements – 2001-2003

	2001	% growth	2002	% growth	2003	% growth
Annual Passengers (mppa)						
- Scheduled	11.9	1.1%	12.5	5.2%	13.5	7.6%
- Charter	2.4	17.3%	2.6	5.2%	2.4	-7.2%
- Total	14.3	3.5%	15.1	5.2%	15.9	5.1%
Aircraft Movements (000)						
- ATMs	170.1	4.8%	166.0	-2.4%	162.9	-1.9%
- Other (GA/Corporate)	15.6	-13.3%	15.9	1.4%	14.8	-6.3%
- Total	185.7	3.0%	181.9	-2.1%	177.8	-2.2%

The traffic trends over the past three years indicate a steady growth in scheduled passenger traffic, with charter traffic rising by 5.2 percent in 2002 but falling back by 7.2 percent in 2003. The overall level of aircraft movements declined in both 2002 and 2003 and continues to fall in 2004, reflecting increasing passenger loads per movement and a reduction in the level of general and corporate aviation.

In terms of traffic profile, there is a heavy concentration on UK and near-European scheduled destinations. Other key route groups include scheduled services to North America and charter flights to both southern Europe and North America.

Figure 3.1 Dublin Airport - Total Passengers by Airline - 2003 - mppa



As shown in Figure 3.1, Ryanair and Aer Lingus account for some two-thirds of all Dublin traffic. Other key airlines include bmi/bmi baby, Aer Arann and the charter operator, Futura Airlines.

3.2 Aer Rianta traffic forecasts

Aer Rianta prepare annual forecasts for Dublin Airport, the latest of which are given in 'Forecast 2003'[10]. These are based on an econometric model, followed by an iterative process of review and discussions of the underlying assumptions. The forecasts are prepared under three scenarios – a 'Centreline case', a 'High case' and a 'Low case'. Year-by-year forecasts for annual passengers (by flight type), for air transport movements (ATMs) and aircraft movements for each case are summarised in Table 3.2 below.

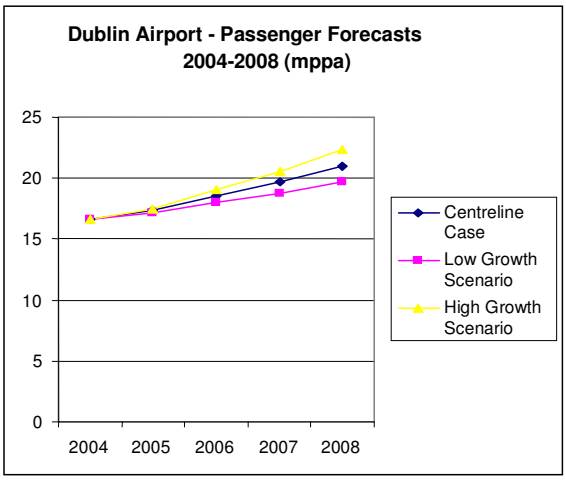
Table 3.2 Aer Rianta Traffic Forecasts – 2004-2008

mppa	2004	2005	2006	2007	2008
Centreline Case					
Passengers (mppa)	16.6	17.4	18.5	19.7	21.0
% annual growth	-	4.4%	6.8%	6.3%	6.7%
A/c movements (000)	173.9	173.5	176.7	180.3	183.7
% annual growth	-	-0.2%	1.9%	2.0%	1.9%
Low Growth Case					
Passengers (mppa)	16.6	17.2	18.0	18.8	19.7
% annual growth	-	3.2%	4.8%	4.3%	5.1%
A/c movements (000)	173.9	171.8	172.1	172.7	173.5
% annual growth	-	-1.2%	0.2%	0.4%	0.5%
High Growth Case					
Passengers (mppa)	16.6	17.5	19.1	20.6	22.3
% Annual growth	-	5.6%	8.8%	8.2%	8.2%
A/c movements (000)	173.9	175.5	181.8	188.5	194.7
% annual growth	-	0.8%	3.6%	3.7%	3.3%

The forecasts suggest that passenger traffic at Dublin is expected to rise by between four and seven percent per annum to 2008 under a Central Case scenario, with aircraft movement levels remaining steady or rising by about two percent per annum. These forecasts are in line with other major UK and European airports.

In assessing capacity at the airport, we have looked at the implications of the fleet upgrades proposed by Ryanair and Aer Lingus over the next three years (particularly in view of stand requirements) and at the possibility of a new low-cost airline entrant. In view of recent experience at Dublin and current market conditions, we regard the latter to be highly unlikely.

[10] Forecast 2003 – Aer Rianta Report, completed September 2003



3.3 Capacity implications

To assess the extent to which Dublin's traffic is peaked through the year and through the day, we have analysed the passenger and aircraft movement levels in terms of the Busy Hour Rate (BHR) which represents the hourly flow rate exceeded by five percent of all passengers or aircraft movements). This has been derived using hourly traffic data provided by Aer Rianta for 2003. The BHR has been calculated for departure, arrivals and two-way departure/arrival passengers and for total aircraft movements.

Table 3.2 Dublin Airport – Busy Hour Rate (BHR) - 2003

	Busy Hour Rate (BHR)	Busy Hour	Date	Day of Week
Passengers				
Departures	2,491	1500-1600	25 September	Thursday
Arrivals	2,289	1300-1400	4 January	Saturday
Departures/Arrivals	4,181	0800-0900	30 May	Friday
Aircraft Movements				
Total	35	1700-1800	2 May	Friday

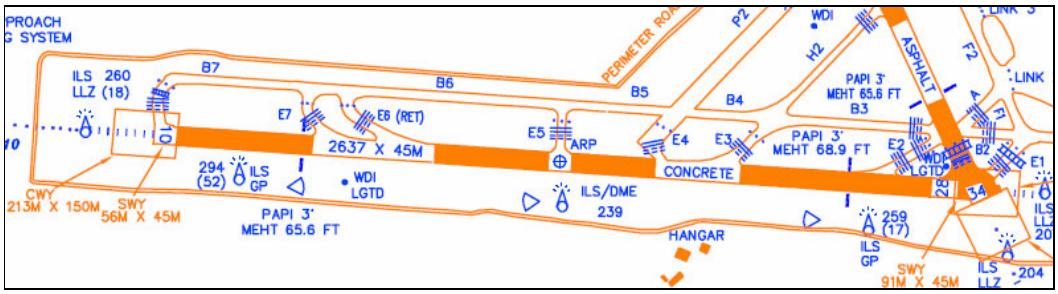
This analysis suggests that achieved busy hour traffic flows seem to be significantly lower than suggested under the scheduling constraints of 3,250 departure, 3,000 arrivals passengers and 44 aircraft movements (max) per hour over a two hour period. In practice, it is possible that actual hourly flows into certain areas may be slightly higher than the BHR figures, which is based on runway departure times. Passenger flows in landside areas will also include escorts and airport staff and there may be some differential build up of passengers over certain time periods or flight delays which could slightly increase these figures. Nevertheless, the BHR figures suggest that the current scheduling constraints used are ample and that congestion levels are potentially manageable in all functional areas.

4 Runway usage and potential capacity

4.1 Runway 10 / 28

Overall runway dimensions are 2637m long x 45m wide. This runway is used for both arrivals and departures under normal prevailing wind operational conditions. Both Runway 10 and 28 are equipped with PAPI[11] and ILS[12] CAT II for Runway 10 and CAT IIIA for Runway 28. Taxiway E6 (Runway 28) is the only Rapid Exit Taxiway (RET) at Dublin Airport[13]. The runway layout and associated taxiway infrastructure is shown in Figure 4.1 below.

Figure 4.1 Runway 10 / 28 Dublin Airport



Source: Aeronautical Information Publication, Ireland[14]

Standard instrument departure routes (SIDs) serving Runway 28[15] include Tolka[16], Vatry, Clonmel, Bepan, Melik, Kepo, Ranar, Gelki, Boyne and Liffy. SIDs serving Runway 10 include Tolka, Vatry, Clonmel, Bepan, Ranar, Gelki, Boyne and Liffy.

4.2 Runway 16 / 34

Overall runway dimensions are 2072m long x 61m wide. This runway is used under (a) cross-wind conditions that limit operations on Runway 10 / 28, (b) at ATC discretion, for departures (34) while Runway 10 / 28 is in operations, and (c) during planned maintenance of Runway 10 / 28. There are no high-speed exits. Both Runway 16 and 34 are equipped with PAPI and Runway 16 is equipped with ILS CAT I. The runway layout and associated taxiway infrastructure is shown in the following Figure 4.2.

11 Precision Approach Path Indicator is a visual aid that enables a pilot making a runway approach to acquire and maintain the correct guide path.

12 Instrument Landing System provides a straight-line descent path to the runway under specified low-visibility conditions, CAT I being the least severe, CAT III the most severe.

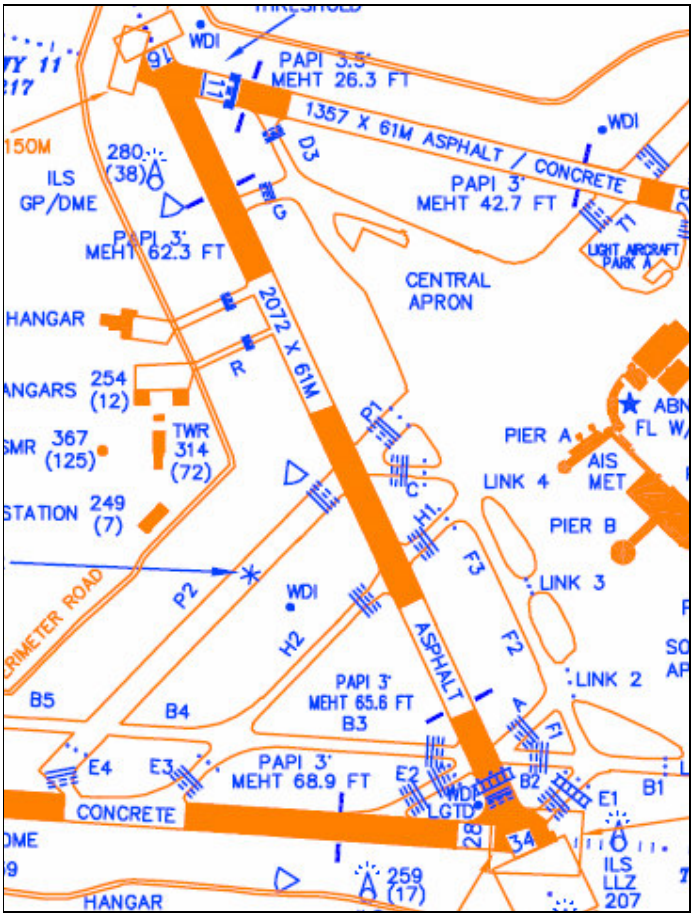
13 For further details refer to the Aeronautical Information Publication, Ireland, effective 10 June 2004

14 Abstracted from electronic version of AIP Ireland (May 2004)

15 Depending on aircraft classification

16 Note that lower case is used in the text for the SID routes

Figure 4.2 Runway 16 / 34 Dublin Airport



Source: Aeronautical Information Publication, Ireland[17]

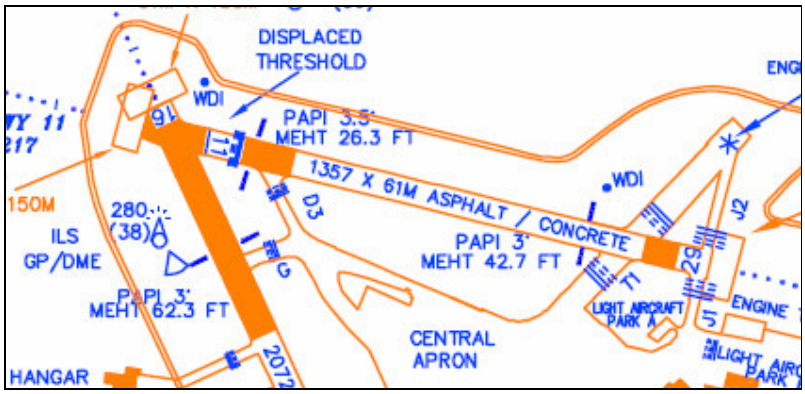
SIDs serving Runway 16 include Tolka, Vatry, Bepan, Clonmel, Ranar, Gelki, Boyne and Liffy. SIDs serving Runway 34 include Bepan, Clonmel, Melik, Ranar, Gelki and Liffy.

4.3 Runway 11 / 29

Overall runway dimensions are 1357m long x 61m wide. This runway is presently closed but expected to re-open after resurfacing and other maintenance works have been completed. When open, the runway is used (at ATC discretion) by small jets and turboprops while Runway 10 / 28 is also operating. Both Runway 11 and Runway 29 are equipped with PAPI. There are no official SIDs for this runway, however, departures may expect an ATC clearance to join a SID serving Runway 10 or 28 at an appropriate point. The runway layout and associated taxiway infrastructure is shown in Figure 4.3 below.

[17] Abstracted from electronic version of AIP Ireland (May 2004)

Figure 4.3 Runway 11 / 29 Dublin Airport



Source: Aeronautical Information Publication, Ireland[18]

4.4 Airspace considerations

For aircraft arrivals to the runway system there are currently four holding points, Rokna, Tulso, Nasri and Dinil. Preferred use depends on which runway is currently active. For example, Rokna and Tulso would generally be used for traffic landing on Runways 28 and 34 whereas Dinil and Nasri are used for traffic landing on Runway 10. Likewise, Rokna and Nasri are used for traffic landing on Runway 16. The Control Tower is currently being refitted with as new ATM system.

4.5 Runway capacity

National Air Traffic Services Ltd (NATS)[19], London, has undertaken the most recent study (2003) on runway capacity[20] at Dublin Airport. It should be mentioned that this study followed the NATS benchmarked approach to runway capacity assessment, as applied in annual runway capacity studies at Gatwick, Heathrow, Manchester, Stansted and Birmingham airports using a fast time simulation model developed for this purpose. The same methodology was also used to establish the declared capacity for Dublin airport for Summer 2003. For this reason, there is no reason to comment further on the study results, having being accepted by all interested parties.

18 Abstracted from electronic version of AIP Ireland (May 2004)

19 NATS, Dublin Airport Runway Capacity Study: Assessment of Runway Capacity for Summer 2004. Final Report. The NATS studies have been requested and funded by Aer Rianta following consultation with the IAA and airline operators.

20 NATS definition of capacity is 'The capacity of a runway is the number of aircraft movements that may be scheduled to use that runway such that their average delay, measured over a period of a given length, does not exceed a specified value.' The average delay would be evaluated over each half-hour period of the day and that the 'specified value' that the average delay must not exceed was 8 minutes, this figure being agreed by the Dublin Airport Coordination Committee.

The study had a number of objectives, the major objectives being summarised as follows:

- Consider the level and pattern of demand for runway usage with particular reference to Summer 2004
- Assess the runway capacity for Runways 28 and 10, as a basis for the agreed formal declaration of capacity for Summer 2004
- Evaluate the effect of changes to procedures with a view to maximising capacity within the existing infrastructure

The capacity of Runway 28 was evaluated as a maximum number of total movements (arrivals + departures) for each of 24 hourly blocks. The movements varied from a high of 44 movements (0600 / 0659UTC[21] and 1600 / 1659UTC) to a low of 32 movements, as shown in the following Table 4.1[22].

In addition, for each 15 minute period, a maximum of 12 total movements including:

- A maximum of 8 arrivals
- A maximum of 8 departures (0000 ~ 0449UTC and 0700 ~2359UTC)
- A maximum of 9 departures (0500 ~ 0659UTC)

The capacity of Runway 10 was evaluated by NATS to be less than the capacity of Runway 28 by five movements in total across the day.

Comparison with other airports indicates that while Dublin is not 'the best in class' for a 'single' runway airport, the capacity is not far short of what other similar airports already achieve, for example, London Gatwick and London Stansted. For example, in 2002, Gatwick Airport had a declared total peak hour capacity[23] of 50 arrivals and departures [44][24], with a maximum of 28 departures [27] and 30 arrivals [25] with an average assumed delay of 10 minutes [8]. Note that there is little significant difference between the comparative departure data but the reasons for an apparent significant difference between the respective peak arrival data may be linked to the fact that very sophisticated arrival sequencing tools are available for Gatwick Approach.

Completion of the Control Tower refit at Dublin may lead to an increase in peak arrivals. Other factors for not achieving a similar capacity to Gatwick may be due to traffic mix, infrastructure differences for example, location and number of RETs, air traffic control separation standards and airport geography. For example, Runway 26L at Gatwick (3316m) is served by four holding points A1, B1, C1 and D1, with the additional benefit of the emergency runway (08L / 26R) as a supplementary taxiway. Runway 28 Dublin also has holding points (E1[25] thru' E4) but the taxiway layout at the threshold of the

21 Coordinated Universal Time (Greenwich Mean Time)

22 Aer Rianta Operations Planning Document / NATS Report

23 Source: IATA Airport Capacity / Demand Profiles 2003

24 Equivalent data for Dublin 2004 in brackets

25 A majority of aircraft use E1 but arrive by different taxi routes, allowing the Tower Controller some choice for departure sequencing.

runway is rather more complicated (Figures 4.1, 4.2) with less opportunity for departure traffic sequencing.

Table 4.1 Runway Capacity Declaration Summer 2004

Hour (UTC)	Max Total Movements to be scheduled	Max Arrivals to be scheduled	Max Departures to be scheduled
00:00	32	23	25
01:00	32	23	25
02:00	32	23	25
03:00	32	23	25
04:00	32	23	25
05:00	32	23	25
06:00	36	21	27
07:00	44	24	24
08:00	37	23	25
09:00	36	23	25
10:00	42	25	23
11:00	41	22	27
12:00	38	23	25
13:00	38	25	23
14:00	42	21	27
15:00	35	23	25
16:00	44	24	25
17:00	41	22	25
18:00	37	23	25
19:00	37	24	24
20:00	37	24	24
21:00	35	23	25
22:00	32	23	25
23:00	32	23	25

Source: NATS Runway Capacity Study / Aer Rianta Operations Planning

Other factors impacting on making best use of available runway capacity (not necessarily unique to Dublin) include some difficulties between 0600 and 0700 hours in securing ATC slots, slot coordination at airport of arrival (Dublin >> Gatwick, Stansted and Manchester), impact on tower control workload due to helicopter movements and general aviation (flying club) operations.

4.6 Options for increasing capacity

As with other airports, declared runway capacities have increased on an incremental basis over a period of years, as seen from a comparison between Summer 2003 and Summer 2004 for Dublin. It is understood that a target is to be adopted of one additional hourly movement by the start of the Summer 2005 season.

Section 4.5 noted that the latest NATS study used an 8-minute delay criterion. The airlines serving Dublin were opposed to a deterioration in level of service and preferred the 8-minute delay standard to be maintained with an emphasis on additional capacity being provided through improvements in procedures

rather than a deterioration in service levels. The 8-minute delay statistic will therefore be used in subsequent NATS assessment work for Summer 2005.

In the meantime, there are ongoing programmes to increase runway capacity on an incremental basis under the auspices of the Dublin Airport Runway Capacity Group, in particular, the Irish Aviation Authority (IAA) runway capacity enhancement programme that has an on-going brief to consider the following procedures and standards:

a) Landafter procedure[26], may have limited potential due to runway length (and lack of high-speed exits) and 3nm radar separation. The procedure is only relevant for a mixed-mode (single) runway during arrival peaks and therefore potential capacity gains are limited.

b) Reduction of separation minima (wake vortex / radar) ~ limited potential if there is an existing 3nm radar separation (for Runways 10 and 28 only) and account should be taken also of wake vortex separation (3nm for B737 following a B737 or similar). Again, this would offer only limited capacity gains during normal mixed-mode operations as the arrival-departure-arrival mode required 5 to 6nm separation. Trials have taken place elsewhere with 2.5nm radar separation but special landing techniques (land-long) would be required to avoid wake vortex problems.

c) Standard separation in the departure-departure interval should be 2 minutes separation for similar type aircraft and 3 minutes for a light aircraft following a jet.

d) Designation of General Aviation routes within the Dublin Control Zone would reduce workload on tower controller.

In addition, there have been on-going discussions about the simultaneous use of Runway 16 / 34 to augment the operations on Runway 10 / 28. In practical terms, the only possible option would be an integrated use of Runway 28 and Runway 34[27] for departures (subject to the head / cross-wind component on Runway 34). Other options are not possible because of runway convergence (Runway 10 and Runway 16) and wind direction. Runway 34 is available for use at the controllers' discretion but while there may be aerodrome operational benefits, problems may be generated for area control with the additional management task of dealing with the convergence of aircraft departing from the two runways on to the same SID and airway routes, and a conflict with the Rokna (ROKNA) standard arrival route. Lastly, as all aircraft that land on Runway 28 must taxi across Runway 34 to access the main terminal resulting in an increased potential for runway incursions.

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26 Two successive arrivals, second aircraft cleared to land and is responsible for maintaining separation behind aircraft in front. Can lead to a missed approach if the first aircraft is tardy in vacating the runway. Procedure believed to be in use at Heathrow and Frankfurt (dedicated 'arrival' runways.

27 In terms of multiple runway use, the IAA have advised that this in effect means the use of Runway 34 for departures when Runway 28 is active. This will be introduced following the implementation of the new Air Traffic Management system and will be used by controllers on a tactical basis (Source: Minutes of the Dublin Airport Runway Capacity Group Meeting, 4th February 2004).

There have also been discussions about the simultaneous use of Runway 11 / 29 and Runway 10 / 28, To do so would require the IAA to develop arrival and departure procedures that would be required for simultaneous operations of the two runways. Note that the simultaneous use of Runways 28 / 29 is theoretically possible but not Runways 10 / 11 due to converging flight paths approximately 4.5nm from the end of the runways[28].

It is intended that once Runway 11 / 29 is re-opened then it would be used on a tactical basis by ATC[29]. Because of the short runway, aircraft types using it could include ATR 42 / 72 (for example, Aer Arann) and the BAe RJ family (for example, Cityjet). Aircraft parked in the Pier A area would have the advantage of reduced taxi times to / from Runway 11 / 29 but there would be marginal benefits for those operators parked in the vicinity of Pier C. Runway 11 / 29 could be possibly used for circuit training but would create increased R/T workload for the ATC controller. Lastly, there are no night restrictions on the use of 11 / 29; the runway is published as a non-instrument runway and as the required lighting to operate at night.

In addition, Aer Rianta, the IAA and the airlines now publish an annual Operations Planning Document (OP.1) with the aim of reducing runway occupancy time, increasing runway efficiency and reducing the probability of go-arounds.

4.7 Taxiway infrastructure and operations

There is a full-length parallel taxiway to Runway 10 / 28 (Link B2 to B7), but none for Runways 16 / 34[30] and 11 / 29. Access to / from the main terminal is via links B1, H1 / H2 and P1 / P2 (Figures 4.1, 4.2). For all routes, Runway 16 / 34 has to be traversed.

As runway capacity is often a function of taxiway layout, the NATS Runway Capacity Study (2003) examined in some detail Runway 28 (refer to Figure 4.1) exit strategy by aircraft type[31]. The findings are summarised as follows:

- *Heavy*: Predominant use of E6 (RET), with a low use of E7. A comparison of 2003 with 2001 data indicates a trend towards more use of E6 and hence reduced runway occupancy time.

- *Medium*: A majority of aircraft exit at E6 (RET) with a significant proportion exiting from E5. E4 and E7 are also used but to a lesser extent. A comparison of 2003 with 2001 data indicates that percentage use of E7 and E6 was little changed, but indicated an increased use of E4 and reduced use of E5.

28 Refer Minutes of the Dublin Airport Runway Capacity Group, 3rd December 2003

29 Refer Minutes of the Dublin Airport Runway Capacity Group, 4th February 2004

30 The Dublin Airport Capital Investment Plan 2003 - 2006 includes Central Apron Phase 4B, completion of parallel taxi route to Runway 16 / 34

31 Based on observed traffic data (2003) cross-checked with 2001 traffic data

- *Small*: Almost equal percentages of aircraft use E3, E4, E5 and E6 (RET). A comparison of 2003 with 2001 data indicates an increased use of E3, E4 and E6, with a significant reduction in the use of E5.

Similarly, Runway 10 (Figure 4.1 refers) exit strategy by aircraft type[32] was summarised as:

- *Heavy*: Most aircraft exit via E2, the remainder by E3. A comparison of 2003 with 2001 data indicates that there is 2003 there was an increased use of E2 compared with E3. Although this would result in an increased runway occupancy time, use of E2 might avoid a conflict with departing aircraft using Taxiway B or offer a more direct route to Piers B and C.

- *Medium*: Little change in data between 2001 and 2003, a majority of aircraft exit via E3 and most of the remainder via E2.

- *Small*: A majority of aircraft exit at E3, the remainder at E2. There is no significant difference between 2001 and 2003 data.

The current Operations Planning Document (OP.1, February 2004) recommends that, to reduce runway occupancy time, jet aircraft landing on Runway 28 vacate the runway at E6 (RET) and non-jet traffic at E5 where possible. Likewise, for Runway 10, all aircraft should vacate at E3 where possible. It is understood that plans are in hand for the designation of taxiway routes between Runway 10 / 28 and the main aircraft parking area.

4.8 Conclusions

The scheduled hourly runway (Runway 28) capacity for Dublin has been based on the results of a study into an assessment of runway capacity for Summer 2004 that was undertaken by NATS in 2003. The capacity for Runway 10 is similar to Runway 28 less five daily movements. Runway capacity has been defined (for hourly blocks) and a total number of movements have also been defined for each 15-minute period within the hourly blocks. The maximum number of hourly movements is 44 (2 hours) and for each 15-minute period a maximum of 12 movements (a specified but variable combination of arrivals and departures). To satisfy the delay criteria (8 minutes) it is not possible to sustain a consecutive throughput of 12 + 12 + 12 + 12 movements for each block hour.

In terms of benchmarking, there are very few airports with which Dublin may be compared, the most obvious examples being London Stansted and London Gatwick. Gatwick is regarded by the industry as being best in class for single runway operations. As the runway capacity at both Gatwick and Dublin airports have been analysed using the same modelling tools then any capacity differences between the two airports are primarily due to different infrastructure layout (number of RETs), traffic mix and ATC procedures (availability of sequencing tools for arrivals). It is understood that a small incremental annual increase to the runway capacity is being targeted for 2005 and this process is expected by Aer Rianta to continue for no more than two

[32] Based on observed traffic data (2003) cross-checked with 2001 traffic data

years. Past history has shown, however, that in the case of Manchester (pre-Runway 2) and Gatwick it was possible to achieve a small but incremental increase in runway capacity over several years.

It is considered, therefore, that no significant increase to the existing peak-hour runway capacity (Runway 10 / 28) is likely to be possible in the short term although there is spare capacity during the off-peak (shoulder) periods. Over a period of years it would be expected that such spare capacity during the off-peak would reduce as traffic demand continues to increase.

The construction of additional RETs may have the potential to marginally increase the capacity of Runway 10 / 28 but the runway length is probably too short (compared with Gatwick) to have a significant benefit. There is little potential benefit in using Runway 34 because that runway is effectively part of the taxiway system when Runway 28 is in use. The taxiway layout between the thresholds of Runways 28 and 34, and the South Apron is somewhat complicated with no holding areas by which aircraft may be held and sequenced for departure.

Dublin has, in theory, the option of having two additional runways available, 16 / 34 and 11 / 29 (on re-opening), to enhance the overall runway capacity of the airport. In practical terms, simultaneous operational use of these runways with 10 / 28 is unlikely to provide significant and consistent capacity benefits. Runway 11 / 29 is only suitable for the operations of turboprops and small jets; these comprise only a small percentage of aircraft operations at Dublin. Runways 10 and 16 could not be used simultaneously for safety reasons and Runway 34 could only be used for a limited number of departures[33] while Runway 28 is operational.

Nevertheless, the minutes of the Dublin Airport Runway Capacity Group (31st October 2002) included discussion on the evaluation by NATS of the additional capacity that could be obtained by using Runway 10 / 28 with Runways 16 / 34 and / or Runway 11 / 29. The final conclusions were that…*'With the benefit of changes to procedures and infrastructure, the overall capacity of Runways 28 / 29 and Runways 10 / 11, using a mixed mode operation on both runways, is 15 extra movements per hour above the declared capacity*.' There are a number of caveats and these are reproduced in the minutes but the point was emphasised that mixed mode operations on two 'parallel' runways is a procedurally complex ATC operation, both in the air and on the ground. However, in view of the limited number of aircraft (primarily turboprops) that could use Runway 11 / 29 and taking into account the time frame by which the appropriate ATC procedures could be introduced (if agreed to by the IAA), it is unlikely that Runways 16 / 34 and 11 / 29 could make a significant additional contribution to overall runway capacity at Dublin within the next 3 years.

To conclude, does the current situation vis-à-vis runway and taxiway capacity justify a move from coordination to full coordination? There would appear to be little reason to change, off-peak capacity is available, Runways 29 and 34 could be used to reduce departure queues on a tactical basis and overall

[33] The number of departures would be limited, as arriving aircraft landing on Runway 28 would then have to cross Runway 34 to access the main terminal.

system constraint appears to be centred on the terminal area rather than airside infrastructure. The relative position between airside and landside congestion could change with the construction of a second terminal / new pier but this is unlikely to be completed within the next 3 / 4 years.

5 Terminal capacity and congestion levels

5.1 Background

All airport terminals are comprised of a number of facilities and passenger processing areas which, in terms of available space and/or queuing/service times can potentially limit the overall terminal capacity. Several techniques are available to assess the capacity of individual facilities including simulation modelling and the use of parametric equations based on passenger usage, flow rates, service and dwell times. The most widely used parametric equations are those developed by the International Air Transport Association (IATA) and by BAA.

As in all parametric analyses, the results are dependent on the values of the input variables and model assumptions. In Sections 5.4 – 5.6, we show the capacities of the key terminal facilities at Dublin as assessed in the PM/TPS study under the IATA/BAA methodologies using their own / Aer Rianta's values of the main input variables. The PM/TPS study incorporated a special modification to this parametric analysis in that various 'unused' areas were excluded or 'detuned' from the main facility space calculations. Whilst we accept that some limited detuning might generally be regarded as legitimate, we feel that the extent to which this has been used in the PM/TPS study is beyond commonly accepted principles for an analysis of this type. We have also adopted the BAA methodology with some revised input data to provide our own capacity estimates.

The IATA methodology incorporates a measure of service level standards, based on the average floor space (square metres) per passenger in each facility. This ranges from 'A' – 'E' where level 'A' is excellent, level 'D' is desirably the lowest level achieved in peak operations and level 'F' is the point of system breakdown or congestion. Aer Rianta have stated that they intend to achieve a 'B/C hybrid' service standard at Dublin Airport in the future.

In assessing terminal capacity, we have also taken account of the fact that passenger flows are not necessarily easily modelled. For some facilities, the size of the floor area is often loosely defined, with some processing areas, such check-in queuing, often over-spilling into general circulation space (eg the main departures concourse). In addition, a parametric approach to capacity assessment does not readily take account of the randomness of passenger pre-departure arrival times at the airport, dwell times in facilities etc. We have therefore taken account of various passenger surveys and observational studies on queue lengths and processing times that are undertaken by Aer Rianta at Dublin airport on a regular basis.

It should be noted that the standards of congestion within airport terminals have significantly changed across the world over the past five years, due to a combination of infrastructure, staffing and cost constraints and the impact of increased security measures following September 11. As a result, the service level and space standards set in the IATA and BAA methodologies should not necessarily be regarded as universally applicable.

5.2 Conversion factors

A key aspect in evaluating the overall capacity of an airport is the conversion of hourly passenger flows (eg through individual airport facilities) into annual capacity figures for the airport as a whole. As a general rule as annual traffic increases the ratio of peak or busy hour to annual passengers decreases. This is because, as traffic increases it tends to spread the peaks and the traffic throughout the year becomes more evenly distributed. It is also true to say that the nature of traffic (scheduled or charter) and the origins and destinations of the majority of the traffic also influence the ratio. A predominately charter airport will tend to have a higher peak/busy hour to annual ratio and an airport handling say mainly transatlantic traffic will have a higher ratio than an airport handling say mainly European traffic as the transatlantic traffic tends to peak more in the morning and evening periods.

Various ratios have been used in previous Dublin terminal capacity studies. The SH&E study used two multipliers to convert hourly capacity to an annual figure in order to produce a range, these were 5,000 and 4,618. The PM/TPS study adopted a multiplier of 5,000, whilst earlier studies used other figures.

Work undertaken for the Commission for Aviation Regulation[34] using historic traffic data showed that the BHR/annual multiplier at Dublin was significantly higher over the period 1997-2002 than the figure adopted in the PM/TPS study. Based on departure passengers only, the BHR/annual multiplier rose progressively each year from 5,585 in 1997 to 6,024 in 2002. Our own calculations in Section 3.3 indicate that, in 2003, the multiplier rose to 6,383. Similar increases were recorded for arrival passengers – 6,289 in 1997 increasing to 6,926 in 2002 and 6,946 in 2003.

The BHR/annual multiplier is important as it is a measure of how peaked the passenger distribution is throughout the day and across the year. An increasing multiplier over time suggests that the distribution is tending to get flatter (ie less peaked). From a capacity standpoint, this indicates that for a given constraint (eg a maximum of 3,200 departure passengers per hour), the overall annual capacity is tending to increase.

The declared capacity limits at Dublin for scheduling purposes in 2004 are:

- Maximum number of arriving passengers per hour: 3,000
- Maximum number of departing passengers per hour: 3,250

On the basis of the Aer Rianta annual passenger forecast for 2004 of 16.5mppa this would produce ratios of 5,500 and 5,076 respectively.

In our own assessment of the capacities of the individual terminal facilities, we have used a range to indicate the appropriate conversion factor between the Busy Hour Rate passenger flow rate and annual capacity. We assume that this would range between 5,250 – 5,275 for departure and 5,500 – 6,000 for arrivals passengers. Given the recorded BHR and annual traffic levels at Dublin in the past three years, this multiplier must be regarded as conservative. Ultimately, however, the values of the multipliers may not

[34] 'Critical Appraisal of Dublin Airport Baseline Report E/F', W.Hynes, 13 May 2004

necessarily be crucial for this study as the key issue in relation to slot coordination is whether a specific hourly (or three-hourly) capacity constraint is appropriate and whether a continued voluntary system of coordination would result in significant breach of this limit resulting in unacceptable congestion.

5.3 Spatial layout and terminal facilities

The main passenger terminal at Dublin Airport has a gross floor area of approximately 75,438 square metres excluding plant room, support and maintenance buildings etc but including the facilities that are central to the operational functions of the airport. The core terminal, which was significantly extended over the period 1999 and 2001, is arranged on three floor levels with arrivals on the ground floor level, departures on the 1st floor level and a landside food and beverage area at a mezzanine level. There are three main piers (A, B and C) with contact stands and associated gate lounges and a connection through to the Old Central Terminal Building (OCTB). The OCTB is now disused except for some additional gates which provide increased stand capacity for Pier A.

The key terminal facilities and their associated floor space (as given in the PM/TPS study) are shown in Table 5.2 overleaf. In addition to these, a further capacity constraint is the kerbside road access to the terminal at both departures and arrivals levels.

5.4 Core terminal – Departures level

5.4.1 Landside concourse

Description

The main landside departures concourse covers an overall floor area of 14,852 sq metres. It contains six longitudinal islands of check-in desks, in front of which is a queuing area. To assist circulation, a one metre width passageway is marked between each check-in island. Other facilities include airline ticket desks, a bank, several retail outlets and FIDS (flight information systems). There is some limited seating available.

Capacity Assessment

The main departures concourse is the initial point of entry into the airport for departure passengers and provides space for orientation, for viewing the FIDS screens and for general circulation. In terms of assessing the available floor space for these activities, it is necessary to deduct the space allocated to the check-in desks (944 sq metres) and check-in queuing space (2,384 sq metres).

Table 5.2 Dublin Airport – Key Terminal Facilities

	Area (sq m)	Total (sq m)
Core Terminal – Departures Level		16824
Area for check-in queues	2384	
Area for check-in desks	944	
Landside concourse		
Passenger security screening - Channel A	279	
- Channel B	324	
Airside concourse	1971	
Core Terminal – Mezzanine floor		9434
Pier A – Ground Floor Level		2307
Gate lounges	1203	
Airside departures concourse	224	
Pier A - First Floor Level		3458
Passport control	52	
Gate lounges	365	
Airside departures concourse	926	
Link Building – Ground Floor Level		1520
Link Building – First Floor Level		1413
Pier B – Ground Floor Level		4169
Passport queuing area – International/EU	158	
- CTA/Domestic	15	
Airside departures concourse	226	
Gate lounges	309	
Pier B – First Floor Level		4656
Airside departures concourse	1420	
Gate lounges	930	
Pier C – Lower Ground Floor Level		997
Pier C – Ground Floor Level		3054
Coaching gate	976	
Pier C – Departures Level		3499
Airside departures concourse	1739	
Gate lounges	816	
Passport queue area	239	
Pier C – Mezzanine Level		2074
Link to main terminal	167	
OCTB – Ground Floor Level		1502
Gate lounges	441	
Airside departures concourse	493	
Core Terminal – Arrivals level		20362
Baggage reclaim hall (excl belts)	3645	
Area of belts	697	
Area of trolley storage	135	
Landside concourse	2965	
Total		75438
Basement Level	10925	

This reduces the effective floor area for circulation to 3,657 sq metres. In calculating the capacity under the BAA methodology, the PM/TPS study made a further reduction in the floor area to account for 'unusable' space (eg areas in front of the ticket desks, areas for trolley parking etc). This 'detuning' exercise produced a revised floor area of some 2,495 sq metres.

The BAA and IATA hourly capacity figures were calculated by assuming a fixed space allowance for circulation (2.15 sq metres per person) and an average dwell time of 30 minutes per passenger and 20 minutes per escort. These are given in Table 5.3 below. In our own assessment, we accept, to some extent, the validity of the detuned figures, although in any type of facility there are usually parts of the floor area which are preferred by most users. We believe, however, that the dwell times are far too high as most passengers will generally immediately proceed to check-in (or the ticket desk) and either go directly through to passenger security or go to the food and beverage area on the mezzanine level. We feel that dwell times of 20 minutes per passenger and 10 minutes per escort are, from our own experience, more realistic – which would effectively double capacity in this area.

It is important to appreciate that, given the separation of commercial areas and check-in queuing areas, the space defined as 'landside concourse' is effectively only used for ticket desk queuing, circulation, orientation and to a small extent for waiting, although there are few seats provided. Indeed, under the detuned area calculations, most of the ticket desk queuing space has been removed from this area. In practice, after entry into the terminal building, most passengers will proceed quickly to the check-in queue or alternatively to the restaurant/bar facilities on the mezzanine floor. Whilst our average passenger dwell time estimate of 20 minutes in this is an assumption based on our own observations rather than survey data (which is not available for this defined area), we believe that is a conservative figure, and may, in fact, be a considerable over-estimate.

Table 5.3 Dublin Airport – Landside Concourse – Departures Level

	Hourly Passengers (equiv)	Annual Capacity (mppa)
PM - IATA methodology		
Total – IATA level B standard	1,900	9.5
Total – IATA level C standard	2,300	11.5
PM - BAA methodology		
Total – Basic	3,540	17.7
Total - Detuned	2,420	12.1
ASA - BAA methodology	3,835	20.1-22.0

It should, however, be pointed out that any overspill from the check-in queuing area may effectively reduce this area and create pinchpoints as passenger circulate within the departures concourse. This is particularly noticeable along the main front throughway where passengers queuing for check-in and the ticket desks can conflict with the general 'circulation' of passengers within the terminal and in certain check-in positions on Island 11/12 which can conflict with passengers queuing at Security Area A. These overspills are potentially the most significant cause of congestion within the terminal; however they are largely under the operational control of the airlines, the passenger handling agents and the airport, rather than a defining constraint on terminal capacity. In our assessment, it is the impact of an inadequate number of check-in desks open during the key period from 2 hours 30 minutes to 1 hour prior to flight

departure which is the primary cause of congestion in the landside area of the terminal.

5.4.2 Check-in desks and associated queuing areas

Description

There are a total of 142 check-in desks which are arranged in six islands of 20 desks each (Areas 1/2, 3/4, 5/6, 7/8, 9/10, 11/12) and along the edge of the main departure concourse (Area 13). There are currently also 35 self-service check-in desks for Aer Lingus' flights and sited in Area 2,3 and 4 and close to the Aer Lingus ticket desk (hand baggage only). A further two self service check-in desks for SAS flights are provided in Area 1. It is understood that BMI/BMI Baby are likely to introduce their own self-service check-in desks within the next year.

The allocation of check-in desk areas between airlines is shown in Table 5.4

Table 5.4 Dublin Airport – Check-in area allocations – May 2004

Check-in Area	Airline
Areas 1/2	SAS, Braathens
Area 3	Aer Lingus, Finnair
Area 4	Aer Lingus, British Airways, Iberia, Luxair
Area 5	Aer Lingus, Aviance
Area 6	British Midland, BMI Baby, Lufthansa, Austrian
Area 7/8	Ryanair
Area 9	Aer Arann, Alitalia, Air Wales, Euromanx
Area 10	Air France, Hapag Lloyd, Cityjet, Spanair
Area 11	Futura
Area 12	Czech Airlines, Malev Hungarian, My Travel Lite, FlyBe, Luxair, Air Luxor, Skynet, Air Malta, Transavia, Basiq Air, Germanwings
Area 13	Continental, Delta, US Airways, Futura

Area 1 has smaller queuing space than other check-in areas and faces a retail bank located at the edge of the main departures concourse.

The defined queuing area in front of the check-in desks represents a total of 2,384 square metres. However, it is important to appreciate that check-in queues may often spread beyond this area into the 'circulation' space within the main landside concourse, even if there is other space available within the allocated queuing area (eg in front of unused desks). Long queues at individual check-in desks may occur either as a result of an insufficient number of check-in desks opening or due to the early arrival of departure passengers at the airport (before the check-in desks open or when just a single desk is open). In particular, we note that a survey undertaken in 2003[35] indicated that the average overall passenger dwell time at the airport ie between arrival and flight departure is almost two hours (116 minutes), which indicates the importance that airlines and handling agents open an appropriate number of check-in desks at earliest possible time.

[35] 'Dublin Airport Passenger Flow Survey', TNS MRBI, 2003

In addition to check-in, the US airlines operating at Dublin have pre-screening security positions in Area 13, which effectively requires two queuing processes for passengers on these particular flights. This itself can cause congestion at certain times (eg at weekends during the Summer season) due to the high volume of charter passengers checking in at Area 13. It should be noted in this context that a significant increase in transatlantic traffic may potentially arise if the US-Ireland bilateral regulations regarding the Shannon stopover are relaxed. In our view, however, we believe that there is sufficient check-in desk and queuing area capacity in other Areas to cater for any additional transatlantic flights over the next three years.

Staffing Procedures

All airlines (or their passenger handling agents) are responsible for staffing the check-in desks, the number of desks to be opened and for opening and closing times. Every desk is fitted with Departure Control System (DCS)/SITA equipment, although Ryanair operates a fully manual check-in procedure.

Each airline has its own policy on desk opening and closing times – although Aer Rianta, in conjunction with the Airport Operators Committee (AOC), publishes monthly Service Level Performance statistics to monitor desk opening times, queue lengths and queue time. In theory, airlines and passenger handling agents are required to abide by an airport bye-law setting out standards for check-in desk opening requirements (see Table 5.5 below)

Table 5.5 Bye-Law – Statutory Instrument No 323 of 2002 - Airport (Amendment) Bye-Laws, 2002

Amendment 3

In order to facilitate the enhancement of passenger check-in services and security at the State Airports, all providers of passenger flight services shall strictly observe the following check-in desk requirements (save where otherwise authorised by Aer Rianta) with regard to all flights (scheduled and charter)

All destinations:	All required check-in desks to open no later than two hours before scheduled departure time of flight
Flights carrying: 1-50 persons	A minimum of 1 check-in desk to be operational
Flights carrying: 51-200 persons	A minimum of 2 check-in desks to be operational
Flights carrying: over 201 persons	A minimum of 3 check-in desks to be operational

In practice, our own observation suggests that not all airlines abide by these regulations and they are rarely, if ever, enforced.

As far as check-in times are concerned, we note that a survey carried out by Dublin Airport in 2002 showed the processing time at standard check-in desks was 85 seconds per passenger and that for hand-luggage desks was 60 seconds per passenger. Our own limited observations suggest that there is wide variation in these rates, with Ryanair achieving about 50 seconds per

passenger (with both hold or hand luggage only), whilst charter flight (with their additional luggage, push-chairs etc) averaged in the order of 117 seconds per passenger.

Capacity Assessment

We have examined the calculated passenger flow rates and corresponding annual capacities using two industry standard techniques (the IATA and BAA methodologies) and we have made our own estimates based on what we feel are more reasonable assumptions about the underlying parameters. It should be noted that both the IATA and BAA methodologies provide very approximate figures only – due to the random nature of passenger arrival times at the airport, variations in dwell times, flow rates through the terminal etc.

The BAA methodology provides a significantly lower figure of capacity as it assumes that just 67% of desks are open (based on current peak day allocations)[36]. This may be a reflection of the fact that desks are assigned to specific airlines or passenger handling agents, who will not necessarily be operating every desk during peak times. We feel, however, that supply should reflect demand and that the figure of 67% is probably too low as a measure of theoretical capacity. Our estimate is therefore derived using a figure of 75%. Given current operations, we do not believe that the self-service check-in machines will lead to any significant increase in overall flow rates for passengers with hold luggage (as a check-in desk belt position is still required for this) – but, with say an average usage by those passengers with hand luggage only (approx 37%), this would potentially have some impact in this area.

Table 5.6 Dublin Airport - Check-in Desk Processing Capacity

	Hourly Passengers	Annual Capacity (mppa)
IATA methodology		
- Total	6,100	30.4
BAA methodology		
- Total	4,236	21.1
ASA estimate		
- Standard check-in	3,968	20.8-22.8
- Self-service check-in	767	4.0-4.4
- Total	4,735	24.8-27.2

As far as the check-in queuing area is concerned, based on assumptions on the floor area available, the peak hour departure passenger flow (3,276), the proportion of desks open (80%), the average check-in transaction time per passenger (85 seconds), and a peaking factor (50% of passengers arriving in the first 20 minutes of any hour), it is possible to calculate the average floor space per passenger waiting in the queue. The PM/TPS study calculated this to be 1.25 square metres per passenger based on 2001 peak hour departure flows, which is equivalent to IATA service level 'D'.

We do not necessarily defer from these capacity calculations although they make no allowance for the fact that there are differential rates of arrival time at check-in and that an insufficient number of desks for particular flights may not be open.

[36] Dublin Airport ARIS/CI allocation chart for 30 August 2002

5.4.3 Passenger search areas

Description

There are two passenger security screening areas (Areas A and B) which are each equipped with five X-ray machines. Area A serves Check-in Areas 7/8, 9/10, 11/12 and 13 and is used by approximately 55% of all departure passengers. Area B serves Check-in Areas 1/2, 3/4 and 5/6 and accounts for the remaining 45% of departure passengers[37]. Both areas have dedicated queuing space with movable barriers.

Maximum passenger flow rates, queue lengths and queuing times are dependent on a range of variables including the number of hand baggage items per passenger, the processing capacity of the X-ray machines and the number of machines in operation. It should be noted that the processing capacity is dependent on the level of security search required. Standard international security procedures are in adopted, with certain additional features eg the removal of laptop computers from their cases through the X-ray machine. Aer Rianta have set a service level standard that queuing time should not exceed seven minutes on more than 95% of occasions.

Capacity Assessment

Based on these figures, the capacity as derived from the IATA and BAA methodologies is as follows:

Table 5.7 Dublin Airport - Passenger Security Screening - Processing Capacity

	Hourly Passenger Flow	Annual Capacity (mppa)
IATA methodology		
- Total	2,250	10.1
BAA methodology		
- Area A	1,794	9.0 (equiv)
- Area B	2,691	13.5 (equiv)
ASA estimate		
- Area A	1,794	9.4-10.3 (equiv)
- Area B	2,691	14.1-15.5 (equiv)

The BAA calculations take account of the differing proportions of usage of the two areas, although the total average throughput is equivalent to the IATA methodology. Neither methodology, however, takes account of the random nature of passenger arrival at the queue.

Survey data provided by Aer Rianta[38] shows that, during Summer 2003, many passengers experienced long queuing times at the Security Search points (sometimes in excess of 30 minutes). We have been advised that this was due to manning difficulties and that an additional xx staff have been recruited this year to ensure that, where possible, all X-ray machines and security channels are open as and when required to meet the necessary service level standards. Provided this occurs, we believe that the calculated processing capacities are reasonable. However, we are aware that, at certain peak periods, long queues can form at both Security Search points to the extent

[37] Aer Rianta Footfall Count, 2004
[38] 'Dublin Airport Passenger Flow Survey' (op.cit)

that they cross each other, which itself causes congestion and confusion. We also note that there is little area for expansion to accommodate additional channels – so any future increases in processing times (shoe searches etc) would significantly increase queuing times.

5.4.4 Airside concourse

The airside departure concourse consists primarily of a long corridor (known as the 'shopping street' with adjacent retail facilities and special airline lounges and the departure concourses of Piers A, B and C. In total, this covers some 6,901 sq metres excluding commercial areas, of which the 'shopping street' accounts for 1,971 sq metres, Pier A – 1348 sq metres, Pier B – 1,642 sq metres, Pier C – 1,642 sq metres and the OCTB – 493 sq metres.

The PM/TPS study calculates the capacity of these areas based on the specific space standards per passenger (ranging between IATA level B and C standards), the average occupancy times per long haul passenger (67 minutes) and short haul passenger (45 minutes) and the estimated proportion of passengers in non-commercial areas (95%). An estimate of the 'detuned' capacity (after deducting some floor area from the 'shopping street' due to the extension of retail fittings into the circulation space and some overspill area in the Piers) was also calculated. These figures are given in Table 5.8 below.

Table 5.8 Dublin Airport – Airside Departure Lounge Capacity

	Hourly Passenger Flow	Annual Capacity (mppa)
IATA methodology		
- Total – IATA level B standard	3,515	17.6
- Total – IATA level C standard	4,255	21.3
BAA methodology		
- Total – Basic	3,883	19.4
- Total – Detuned	3,200	16.0
ASA estimate		
- Total	3,648	19.2-21.0

In practice, however, the floor area for the airside 'departure lounge' is mainly used as circulation space for trips between different retail and food and beverage areas etc until the passenger reaches the gate lounges. In our view, the estimated proportion of passengers in non-commercial areas is far too high. We would suggest a figure of say, 70% is more appropriate, which would increase the theoretical capacity to 3,648 passengers per hour, equivalent to between 19.2 – 21.0 mppa, although this figure is relatively flexible as passengers' dwell times in circulation space would reduce as the area becomes more congested. We also feel that both the IATA and BAA methodologies are somewhat flawed as they fail to take account of arrivals passengers who are also using this floor space.

5.4.5 Gate Lounges

The overall floor area assigned to the gate lounges is 5,040 sq metres of which Pier A accounts for 1,568 sq metres, Pier B – 1,239 sq metres, Pier C – 816 sq metres and the OCTB – 441 sq metres. A coaching gate in Pier C accounts for a further 976 square metres.

The PM/TPS study analyses the capacity of the gate lounges in terms of the an average space standard of 1.2 square metres per passenger (IATA level B standard) and for 1.55 square metres per passenger (BAA standard). Their capacity calculations, which are based on peak flight loads and 'ideal' space requirements, are shown in Table 5.9.

Table 5.9 Dublin Airport – Gate Lounge Capacity

	Hourly Passenger Flow	Annual Capacity (mppa)
IATA methodology - Total	Not calculated	Not calculated
BAA methodology - Total	1,425	7.5
ASA estimate - Total	3,593	18.9-20.9

Whilst these capacity figures seem to be low, they are highly dependent on the service level standard applied (eg a lower level of seating). There is also some doubt as to whether the BAA methodology is appropriate as it only considers the effective size of the largest gate lounge in each pier (and applies this standard to each lounge) rather than evaluate the gate lounge capacity as a whole. It should also be noted that there is considerable overspill and overlap between the gate lounges and the airside departures areas within each pier. Our own calculations, based on a space standard of 1.0 square metres per passenger (IATA level C), a flight/gate utilisation factor of 0.6 and a peaking factor of 1.25 suggest that the combined annual capacity of all gate lounges at the airport is significantly higher (18.9 – 20.9 mppa).

5.4.6 Passport Control Positions

The passport control positions for arrivals passengers are situated in each Pier. A similar facility, the United States' Immigration and Naturalisation Service (INS) for departure passengers flying to the USA is sited within Pier B.

The PM/TPS study assessed the processing capacity of arrivals immigration and the INS based on the number of desks available and the average transaction times for CTA (Common Travel Area) and EU/International passengers. The PM/TPS capacities, together with our own estimates based a higher busy hour / annual multiplier are given in Table 5.10

Table 5.10 Dublin Airport – Passport Control – Arrivals / INS Facility Capacity

	Hourly Passenger Flow	Annual Capacity (mppa)
IATA methodology		
- Arrivals (all pier positions)	3,730	18.6
- INS	570	-
BAA methodology		
- Arrivals (all pier positions)	5,630	28.1
- INS	Not calculated	Not calculated
ASA estimate		
- Arrivals (all pier positions)	5,890	31.0-33.8
- INS	Not calculated	Not calculated

Although the INS facility seems apparently quite spacious, the trans-atlantic flights are often quite bunched, potentially putting a strain on both passenger processing throughput and gate lounge capacity. Data provided by Aer

Rianta[39] shows that, at peak times, average queue waiting times can be quite long (eg 12 minutes plus), although this is highly dependent on the number of immigration desks open.

5.5 Core terminal – Arrivals level

5.5.1 Baggage Reclaim

The baggage reclaim hall has two wide bodied aircraft and eight narrow bodied aircraft reclaim units and covers a total floor area of 3,510 square metres (excluding the belt area of 697 square metres and trolley storage area of 135 square metres).

The PM/TPS study evaluated capacity in terms of both the baggage reclaim hall and the reclaim units. In the case of the baggage reclaim hall, this is based on the available area (excluding through routes), the average space per passenger (including trolleys), the proportion of passengers with bags and the average waiting time in the hall (based on the reclaim unit utilisation time). A further assessment was made of the 'detuned' capacity after deducting 'unused' floor space (the strip along the front of the baggage reclaim belts and the Ryanair baggage office). Our own estimate is based on the same principles although we have assumed a smaller deduction of floor area for 'detuned capacity'.

Table 5.11 Dublin Airport – Baggage Reclaim Hall – Capacity

	Hourly Passenger Flow	Annual Capacity (mppa)
IATA methodology		
- Total IATA level B standard	3,544	17.7
- Total IATA level C standard	3,985	19.9
BAA methodology		
- Basic	5,006	25.0
- Detuned	3,770	18.9
ASA estimate		
- Total	3,728	20.5-22.4

5.5.2 Customs

The capacity of the customs facility for arrivals passengers was evaluated by using the design flow rate (DFR) and the estimated proportion of passengers passing through the facility (40% of all arrival passengers). The calculated capacities, based on IATA and BAA space standards per passenger, are given in Table 5.12.

Table 5.12 Dublin Airport – Customs Area – Capacity

	Hourly Passenger Flow	Annual Capacity (mppa)
IATA methodology		
- Total	3,200	21.3
BAA methodology		
- Total	3000	15.0
ASA estimate		
- Total	3,840	21.1-23.0

[39] 'Dublin Airport Passenger Flow Survey' (op.cit)

5.5.3 Landside Arrivals Concourse

The overall floor area of the landside arrivals concourse is a total of 2,964 square metres. The main passenger flows are, however, concentrated in the central area where arrivals passengers exit from the customs area where meters/greeters congregate.

The PM/TPS study calculated the capacity of this facility based on the peak hour arrivals flows, the ratio of meters/greeters to passengers and the average dwell times of both passengers (9 minutes) and escorts (36 minutes). The 'detuned' floor space deducted is an area adjacent to a revolving door and a strip along the front of the car hire desks. The PM/TPS capacity figures and our own estimates based on a higher average dwell time of 12 minutes per passenger are shown in Table 5.13 below:

Table 5.13 Dublin Airport – Landside Arrivals Concourse Capacity

	Hourly Passenger Flow	Annual Capacity (mppa)
IATA methodology		
- Total IATA level B standard	4,355	21.8
- Total IATA level C standard	5,274	26.4
BAA methodology		
- Basic	5,360	26.8
- Detuned	5,060	25.3
ASA estimate		
- Total	3,521	19.4-21.1

5.6 Kerbside

5.6.1 Departures level

Description

There are two lanes in the access road to the Departures level (1st floor) of the terminal. Lane 1 is nearest the terminal and is used for passengers and well-wishers setting down. The lane width is one car wide and there are indented parking spaces. Along its length there are a number of vertical circulation cores in the kerb area. Kerb width varies from approximately 6m to as little as 1.5m at the cores. The second lane is separated from Lane 1 by a 2m. pavement area which has breaks along its length to allow vehicular movement from one lane to another. Lane 2 also has indented parking bays. There is a 1m. section along the outer edge of the lane. There are also a number of pedestrian crossings to allow the passengers access to the terminal from the multi-storey car park.

Capacity Assessment

Hourly passenger flow rates and equivalent annual capacities for the departures kerbside were calculated by in the PM/TPS study using both the IATA and BAA methodologies. Both methodologies base their assessment of capacity on total kerb length, the proportion of passengers using cars, taxis and buses, the average number of passengers per vehicle, the average dwell

time and the average length of kerbside used per vehicle (including circulation space). The analysis assumes that there is a queue of waiting vehicles for each set-down.

Our calculations used the same parameters as the PM/TPS study – with a higher hourly/annual conversion factor.

Table 5.14 Dublin Airport – Kerbside Capacity – Departures Level

	Hourly Passengers (equiv)	Annual Capacity (mppa)
PM - IATA methodology	6,891	34.4
PM - BAA methodology	3,196	16.0
ASA - BAA methodology	3,196	16.8-18.3

5.6.2 Arrivals level

Description

The arrivals forecourt has two inbound lanes. One is used by taxis and the other by all other vehicles. The inside lane is reserved for taxis and leads to a taxi parking area at the terminal face. The outside lane starts as a single lane and later widens into two lanes. Approximately half way along the arrivals forecourt there is a wide passenger crossing area to allow access/egress to the multi storey car park and other areas.

The arrivals forecourt has a number of islands with two kerbs allowing both set down and picking up of passengers by busses and coaches. Exit from the forecourt is via single through lanes which thread through the islands. There is also one set down / pick up space for the Aer Rianta bus to the long-term car park.

There are a number of other facilities near the terminal building, which have to be accessed via the forecourt. All such staff vehicles use the arrivals forecourt for access and thus mix with the terminal traffic. Private cars are not allowed at arrivals level and taxis are only allowed to set down at departures level and pick up at arrivals level. Private cars are directed to the multi storey car park after dropping off passengers or prior to meeting arriving passengers and passengers and meeters/greeters have to cross one of the roadways in order to access the terminal, or conversely, the car park.

Private coaches pick up and set down passengers in an area at the rear of the multi storey car park, necessitating passengers with baggage to pass through the car park. Passengers from tour coaches also have to use the pedestrian crossing thus interrupting vehicular flow. Basically the forecourt is poorly designed and has insufficient kerb side space.

Capacity Assessment

The PM/TPS study calculated arrivals kerbside capacity using a similar methodology for that for the departures level. The BAA methodology figures quoted in this study have been reworked based on the proportion of passengers using taxis, buses and coaches, and show similar results to those

calculated under the IATA methodology. It should be noted that private cars are not allowed at arrivals level.

Table 5.13 Dublin Airport – Kerbside Capacity – Arrivals Level

	Hourly Passengers (equiv)	Annual Capacity (mppa)
PM - IATA methodology	3,575 – 4,252	17.9-21.3
PM - BAA methodology	3,575 – 4,128	17.9-20.6
ASA - BAA methodology	3,575 – 4,128	19.7-24.7

5.7 Baggage Handling System

Description

There are two baggage handling systems at Dublin Airport. The eight bay system, which covers Check-in Islands 1/2, 3/4, 5/6 and 7/8 is the older of the two but has been recently upgraded to include integrated hold baggage screening (HBS). The system is a carousel system with manual sorting and make up units for the departures. The second, newer system serves the 6-bay extension to the terminal building (Check-in Islands 7/8, 9/10, 11/12 and 13) and is based on departures with integrated HBS.

Analysis of the system's capacity was not possible in the time period of this study, but we are confident that the baggage handling system capacity is significantly higher that the capacities of some of the other facilities analysed earlier.

The PM/TPS study calculated that on departures the 8-bay system was capable of processing 2692 bags per hour and the 6-bay system 2112 ie a total of 4804, if the system ran at 100% utilisation. The equivalent figure of 80% utilisation was 3842 bags/hr.

In terms of passengers the PM/TPS report calculated that the 8-bay system is capable of handling up to 1600 departing pax/hr per check-in island. The equivalent figure for the 6-bay system is 2795 departing pax/hr through the system. This indicates no capacity problem.

On arrivals there are 6 large capacity arrival reclaim units, 3 medium devices and one small capacity reclaim device. The PM/TPS report states that the theoretical total arrival reclaim device requirement is:

- 2 large arrival reclaim devices at peak (09:30) or 4 medium reclaim sized devices.
- 3 medium arrival reclaim devices are required at peak (8:15, 12:15 and 21:15)
- 9 small arrival reclaim devices are required at peak (14:45) or 4-5 medium arrival reclaim devices.

The PM/TPS study concludes that there would appear to be sufficient arrival reclaim belt length capacity available for the present demands provided the system is used in a balanced manner.

The PM/TPS study goes into some significant detail relating to the shortcomings of the present system and in many instances makes suggestions as to how they might be remedied. That report concludes:

"Baggage Handling Systems are a key component in the airport's operational efficiency and there is no perfect system. The major problems with the existing Dublin system, which will and do create safety, operational and capacity challenges are airside and are associated with the constrained operational capacity of the 6-bay make up and traffic movement conflicts. Health and Safety issues associated with the reclaim units also arise. Some of these can be addressed, but many would involve significant cost. A detailed survey is recommended with the output being a costed and programmed series of prioritise actions with safety being in the lead."

We would concur with this observation, although we note that Aer Rianta have stated that they have now addressed the Health and Safety issues and that they will continue to do so in accordance with good management practice.

From our own observations it was clear that the airlines much prefer the older 8-bay system and are not at all happy with the airside layout and design of the 6-bay system.

Capacity Assessment

In terms of provision of additional capacity to meet 20 mppa the PM/TPS report points out that the 8-bay system can handle the demand with some spare capacity but the 6-bay system is presently limited by check-in capacity. Although this indicated lack of check-in capacity, at the 20 mppa traffic level, is based on the assumption that the desks are allocated in the same way as for the 15 million peak day.

Spare capacity is available on island 9/10 and it is understood that Aer Rianta are already modifying the desk allocation to take advantage of this fact.

5.8 Conclusions

Our analysis has incorporated a parametric approach to assessing the individual capacities of the various spatial and processing functions in the terminal. These range from between 11.5 mppa to 26.4 mppa under the IATA methodology and between 12.1 mppa and 28.1 mppa under the BAA methodology based on input variables assigned by the PM/TPS team. (The BAA figures exclude the gate lounges due to overlap with the airside departures concourses in each pier). In both cases, the lower figures were for the Departure Concourse (Landside), suggesting that this area is the key limiting factor in the building as a whole. Our own estimates range between about 19.0 – 35.0 mppa dependent on the particular facility, with the exception of the departures kerbside (16.8 – 18.3 mppa).

In practice, these types of parametric analysis are somewhat flexible due to the differing spatial standard applied on a per passenger basis – and we accept that, in some areas, these may be somewhat lower than Aer Rianta's stated intention to adopt an IATA B/C hybrid level of service (although not necessarily below the standards achieved at other similar airports). We do

feel that although there can be congestion in the landside departures concourse, this is largely due to operational factors such as the number of check-in desks open and the marshalling of passengers into appropriate spaces.

In the case of the departures kerbside, we accept that the calculated airport capacity is slightly less than the expected traffic levels by 2007, although we believe that there is sufficient lack in terms of actual hourly passenger flows (see the achieved BHR figures in Section 3.3).

In the case of the two baggage handling systems, we recognise that the newer 6-bay system may ultimately be limited by check-in desk capacity. However the two systems working in combination do not represent a defining capacity constraint across the airport as a whole.

6 Aircraft stand capacity

6.1 Existing infrastructure

Parking / stand details commercial aircraft operations at Dublin Airport may be found at EIDW AD 2.24-2, Aeronautical Information Publication of Ireland (effective May 2004). Stands are classified as either contact with air-bridge, or contact (direct surface access between the gate and aircraft), or remote. Physical characteristics and operational requirements, for each stand, are also to be found at EIDW AD 2.24-2. This analysis will concentrate on those contact stands that serve Piers A, B and C.

Pier A (Figure 6.1) is served by stands 8 to 24[4041]. Stands 8,9 and 10 are suitable for the A321 and B738 aircraft. Stands 11,12, 14 – 18, and 20 – 24 are only suitable for smaller members of the B737 family. Stand 8A is suitable for turboprop / regional jet parking and while in use then Stand 8 must be vacant. Stands 13 and 19 are suitable for wide-bodied aircraft but, while in use, Stands 12 / 14 and 18 / 20 respectively must be vacant. Wide-body taxi-in to, and push back from Stand 33 (Pier B) requires Stands 21 and 22 to be vacant. The principal users of Pier A stands are Ryanair and the short-haul operations of Aer Lingus.

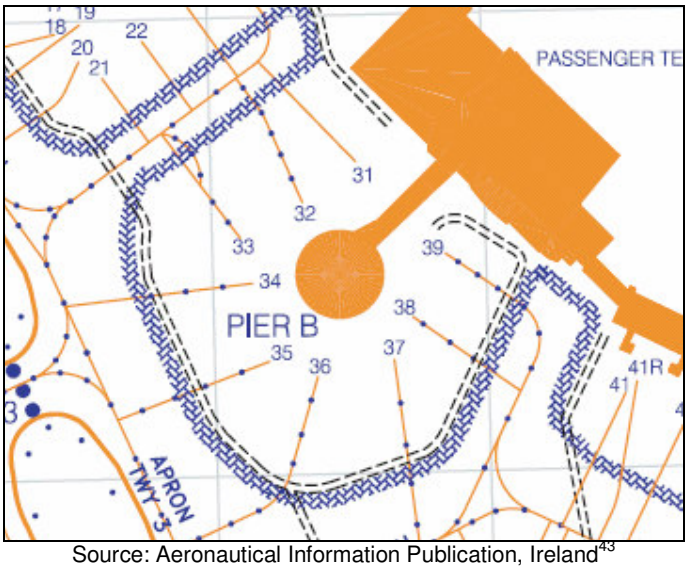
Figure 6.1 Pier A Stands

40 More specifically, a maximum of 3 B737-800, 1 B737-300 and 11 B737-400

41 It is understood from Aer Rianta that a project is planned to commence in September 2004 to realign the stands at Pier A. this will provide for 12 No. B737-800 / A320, and 2 No. B737-400 aircraft with a net reduction of one contact stand.

Source: Aeronautical Information Publication, Ireland[42]

Figure 6.2 Pier B Stands



Source: Aeronautical Information Publication, Ireland[43]

Pier B (Figure 6.2) is served by stands 31 to 39[44]. The constraint exercised by Stand 33 has been described above. Stands 33 to 37 inclusive are suitable for large aircraft operations although Stand 35 is somewhat smaller than the others. Stand 31 is quite small (B734) while the remaining stands (32, 39) can accommodate the A321, and Stand 38 the B757. The principal users of Pier B are Aer Lingus (long-haul) and USA carriers. Hence, the USA INS facilities are located in Pier B.

Pier C (Figure 6.3) is served by stands 41 to 46[45]. Each stand is suitable for the A321 and B738 aircraft. Stands 41R, 43R and 45R are available for wide-bodied aircraft but would require Stands 41 / 42, 43 / 44 and 45 / 46 respectively to be vacant. The principal users of Pier C are those other airlines serving Dublin, excluding the named principal users of Piers A and B.

Stands 48 thru' 135 are remote stands. Stands 49 to 62[46] are located on the South Apron and are used as an overflow for Piers B, C and the Cargo terminal. Stands 48 and 63 – 69 are adjacent to the Cargo terminal. Stands 70 – 75 are part of the Central Apron that also serves Pier A.

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42 Abstracted from electronic version of AIP Ireland (May 2004)

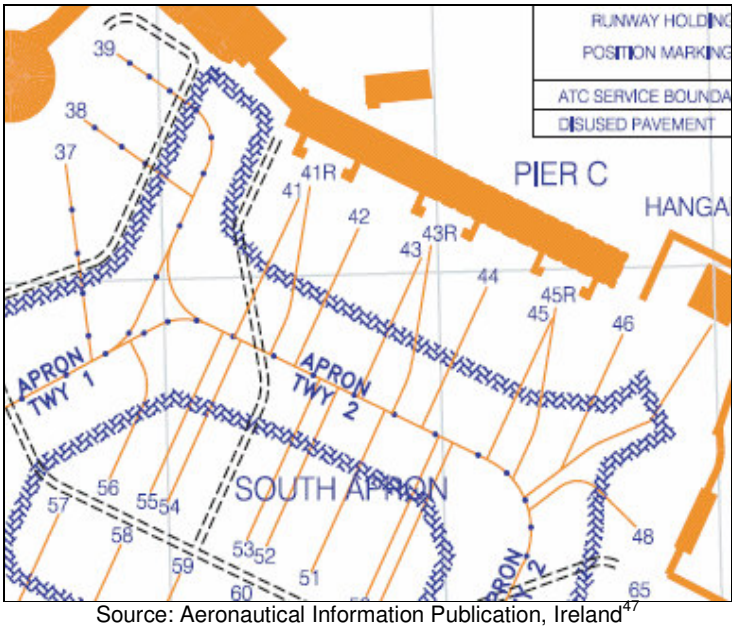
43 Abstracted from electronic version of AIP Ireland (May 2004)

44 More specifically, a maximum of 1 B737-400, 1 A321, 1 B757-200, 1 B747-400 / B777-200, 1 B767-300 and 3 A330-300

45 More specifically, a maximum of 3 A321 and 3 B757-200 stands or 1 A330-300 and 2 B747-400 stands in a mixed mode arrangement

46 The Dublin Airport Capital Investment Plan 2003 – 2006 includes proposed expenditure on the South Apron Infill Phase 5B in which Stands 57 to 62 inclusive would be modified to accommodate 4 wide-body stands / 6 narrow-body stands in mixed mode arrangement.

Figure 6.3 Pier C Stands



Source: Aeronautical Information Publication, Ireland[47]

6.2 Demand Analysis

In summer 2002 season, 93.2% of scheduled flights and 90% of charter services were placed on contact stands. In 2003, contact stand percentage was 96% and a similar level of contact stand utilisation is expected for 2004. Therefore, the vast majority of aircraft are parked on a contact stand, either air-bridge or foot access to / from the terminal building.

The acquisition of a new stand allocation system has enabled the process of stand allocation to be highly efficient in ensuring that maximum use of contact stands is made. Airlines generally prefer contact stands for their operations at Dublin, reasons for this requirement include:

- Operational efficiencies, for example, low-cost airlines and others (the major customer base at Dublin) with a 25 minute turnaround load / unload passengers from both the front and rear aircraft doors and therefore an air-bridge is not required.

- Business-class passengers on network, flag carrier and other long-haul services expect a level of service commensurate with the ticket price and therefore transfer to / from the aircraft by air-bridge is preferred.

- There would be logistical problems in bussing 250 to 400 passengers travelling on charter and long-haul carriers to / from remote stands, and including access requirements for disabled passengers on Lourdes flights.

47 Abstracted from electronic version of AIP Ireland (May 2004)

For this reason, the Aer Rianta stand allocation guide for Summer 2004 uses a 'ranked' allocation process based on:

- Firstly, aircraft size (priority for aircraft in excess of 50 seats ~ this would apply to most commercial operations except turboprop and General Aviation)

- Priority services: (a) services to USA requiring INS facilities at Dublin, (b) services with a turnaround time of less than 30 minutes ~ primarily Ryanair but also Aer Lingus, (c) Services (normally) carrying 5 or more disabled passengers ~ assumed to be charter flights to Lourdes

- Aircraft passenger capacity (again, turboprops and General Aviation lose out)

- Year round service (scheduled services by home-based carriers and other airlines)

- Service frequency (scheduled services by home-based carriers and other airlines)

In practice, most services are able to operate from a contact or contract / air-bridge stand. In January 2004 only 4% of all departing aircraft and 2% of all departing passengers used a remote stand. This percentage is likely to be higher during the summer period when charter services are operating at their peak. In January, users of remote stands included Aer Arann, Air 2000, Spanair, Skynet, and EU Jets. The most use of contact stands (non air-bridge) was made by Ryanair, Aer Arann, British European, Air Wales, Euromax, Loganair, BA, Skyways, Skynet, Luxair, and Austrian. The remaining carriers (network and charter) had access to contact air-bridge stands.

Planned stand allocation data was provided for Thursday 13th May 2004[48]. The North Apron (Stands 5 – 7) was clear until mid-evening. The Central Apron (Stands 76A, 115 – 134) had about a 25% occupancy rate, mainly long-term parking. The Central Apron (Stands 70 – 75) had a similarly low level of utilisation. Stands 08 to 24 inclusive (Pier A) were planned to have an average of 8 aircraft movements[49] / stand during the day, Stands 11 and 16 each being used by 12 aircraft. Utilisation of Stands 22[50], 23, and 24 was relatively low although Stand 21 accepted 9 aircraft movements during the day. Stands 31 to 39 inclusive (Pier B) were planned to have an average of 7 aircraft / stand during the day. Stands 41 to 46 inclusive (Pier C) were planned to have an

48 Aer Rianta provided additional stand allocation data, for a peak day period in September 2003 and a busy week period in August 2003.

49 Note that most, if not all, stands in Piers A, B and C are used for over-night parking, during a core period that generally lasts between 2100hrs and 0530hrs UTC during the summer months. Comments on stand utilisation therefore take no account of this but concentrate on the time frame from 0530hrs to 2100hrs UTC (note that this time frame will vary slightly from stand to stand). For the purpose of our analysis it has been assumed that aircraft movement to and then from a stand would normally be one of (a) arrive, unload, load, depart (b) tow-on, load, depart, and (c) arrive, unload, tow-off.

50 Note that utilisation for Stands 21 and 22 may be reduced due to wide-bodied aircraft occupancy of Stand 33.

average of just less than 8 aircraft / stand during the day with Stand 46 having the lowest level of use (3 departures / 3 arrivals). The South Apron Stands (48 to 62 inclusive) had a low planned level of utilisation, as did the Cargo Area Stands (63 to 69A inclusive).

A stand allocation plan for the Summer 2004 schedules[51], for each day of the week, has also been reviewed to determine the extent of spare capacity. For this purpose, each stand was examined for unused blocks of time during the operating day[52]. This was expressed in terms of whole hours[53] (assuming for simplicity 10 minutes between stand vacation and the next arrival, and a nominal 40 minutes turnaround time for a single hour, with up to a 50 minute turnaround for unused time blocks of two hours or more). Piers A, B and C were examined separately, although the interaction between Stands 21, 22 and 33 was taken into account. As the definition of maximum (numerical) stand-capacity is linked to assumptions on turnaround time and a buffer time between departure and the next arrival then, for example, a 40min + 10min assumption (see above) would indicate a potential maximum of 15 aircraft movements per day. In practice, some aircraft movements are scheduled for a 25-minute turnaround and others (long-haul) require a turnaround time measured in hours rather than minutes. In addition, aircraft arrivals and departures, as actually happens, have an element of randomness due to early / late arrivals and departures and a practical maximum number of aircraft movements using the above assumption might be in the order of 13 aircraft movements using a traffic intensity factor of 0.85.

Based on review outlined above, Table 6.1[54] shows the results from the aircraft stand occupancy analysis that was undertaken for each of piers A, B and C. From the analysis it can be seen that peak use of Pier A occurs on Monday and Friday with the lowest level of use on Saturday. In contrast, the peak use of Piers B and C occurs on Saturday and Sunday with the lowest level of use on Mondays and Wednesdays. The is indicative of the type of traffic using different piers, the weekday short-haul scheduled services in Pier A compared with the weekend charter peaks using Piers B and C.

Aer Rianta, in their response to the Draft Report, have produced their own calculations and these are reproduced as Tables 6.2 and 6.3.

From Table 6.1, it can be seen that the highest numbers of aircraft movements per stand (ASA calculations), for each Pier, are as follows:

- Pier A, Monday and Friday
- Pier B, Saturday and Sunday
- Pier C, Saturday and Sunday

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51 The stand allocation plan reviewed addresses the period 28th March to 30th June 2004; a subsequent plan has now been issued for 1st July 2004 onwards.

52 Note that the analysis does not take into account first departures and last arrivals on each stand (over-night parking).

53 Part hours were not included in the analysis.

54 Note that the analysis shown in Figure 6.1 does not take into account first departures and last arrivals on each stand (over-night parking).

Table 6.1 Aircraft stand occupancy analysis for Piers A, B and C (Consultants Analysis)

Pier	Weekday	Aircraft movements / stand[55]	Spare 'hours' / stand[56]	Notes
A	Monday	***7.7***	4.9	Spare capacity distributed evenly throughout day, used for overnight parking 2200 to 0500UTC
	Tuesday	7.1	5.4	Refer to Monday
	Wednesday	7.3	5.5	Refer to Monday
	Thursday	7.3	4.9	Refer to Monday
	Friday	***7.8***	4.7	Refer to Monday
	Saturday	6.3	5.9	Significant spare capacity after 1200 UTC
	Sunday	7.1	5.3	Refer to Monday
B	Monday	5.9	4.8	Spare capacity mostly after 1200 UTC
	Tuesday	6.9	4.9	Refer to Monday
	Wednesday	6.0	5.6	Spare capacity mostly after 1100 UTC, low utilisation of Stands 31 / 32
	Thursday	7.3	3.6	Spare capacity mostly after 1200 UTC, low utilisation of Stand 31
	Friday	7.3	4.2	Spare capacity mostly after 1300 UTC, low utilisation of Stand 31
	Saturday	***8.9***	2.9	Spare capacity mostly after 1600 UTC, low utilisation of Stand 31
	Sunday	***8.2***	2.1	Spare capacity mostly after 1700 UTC, low utilisation of Stand 31
C	Monday	6.7	4.5	Spare capacity distributed evenly throughout day
	Tuesday	7.5	3.7	Refer to Monday
	Wednesday	6.7	4.5	Refer to Monday
	Thursday	7.3	5.2	Refer to Monday
	Friday	7.8	4.0	Refer to Monday
	Saturday	***9.0***	3.5	Spare capacity mostly between 1400 and 2100UTC
	Sunday	***8.7***	2.0	Spare capacity mostly between 1400 and 2100 UTC

55 Night parking not included

56 Part-hours not included

Table 6.2 Aircraft stand occupancy analysis for Piers A, B and C (Aer Rianta Analysis for 31st May / 6th June 2004)[57]

Pier	Weekday	Aircraft movements / stand - ASA Report	Aircraft movements / stand - Report Aer Rianta check	Aircraft turnarounds / stand ~ using Aer Rianta def. of movement[58]	Aircraft turnarounds / stand ~ using Aer Rianta def. of movement and extra hour (0530 - 2200UTC)
Pier A	Monday	7.7	7.7	8.2	8.5
	Tuesday	7.1	7.1	7.3	7.9
	Wednesday	7.3	7.3	7.9	8.1
	Thursday	7.3	7.3	7.9	8.1
	Friday	7.8	7.7	8.6	8.8
	Saturday	6.3	6.3	6.9	7.3
	Sunday	7.1	7.3	7.9	8.2
Pier B	Monday	5.9	5.9	6.2	6.6
	Tuesday	6.9	6.8	7.2	7.3
	Wednesday	6.0	5.9	6.4	6.6
	Thursday	7.3	7.0	7.3	7.8
	Friday	7.3	6.9	7.5	7.6
	Saturday	8.9	8.2	8.5	8.9
	Sunday	8.2	7.7	7.9	8.2
Pier C	Monday	6.7	7.2[59]	8.1	8.3
	Tuesday	7.5	6.9	8.6	8.7
	Wednesday	6.7	6.7	7.6	7.6
	Thursday	7.3	7.2	8.0	8.0
	Friday	7.8	8.5[60]	8.8	9.3
	Saturday	9.0	8.7	8.8	9.5
	Sunday	8.7	9.2	9.5	9.8

From Table 6.2, it may be seen that the highest numbers of aircraft movements per stand (using the Aer Rianta definition of movement and extra hour), for each Pier, occur as follows:

- Pier A, Monday and Friday
- Pier B, Saturday and Sunday
- Pier C, Saturday and Sunday

57 Abstracted from Aer Rianta Review of ASA Runway Capacity Draft Report
58 An aircraft movement is either an arrival or departure
59 Wide-body movements not taken into account by ASA calculations
60 Wide-body movements not taken into account by ASA calculations

Table 6.3 Aircraft stand occupancy analysis for Piers A, B and C (Aer Rianta Analysis for 2nd August / 8th August 2004)[61]

Pier	Weekday	Aircraft movements / stand - ASA Report (1st Season Plan)	Aircraft movements / stand - Report Aer Rianta check	Aircraft turnarounds / stand ~ using Aer Rianta def. of movement[62]	Aircraft turnarounds / stand ~ using Aer Rianta def. of movement and extra hour (0530 - 2200UTC)
Pier A	Monday	7.7	7.6	8.2	8.5
	Tuesday	7.1	7.1	7.9	8.2
	Wednesday	7.3	7.3	8.0	8.3
	Thursday	7.3	7.4	7.9	8.3
	Friday	7.8	7.7	8.3	8.7
	Saturday	6.3	6.7	7.4	7.8
	Sunday	7.1	7.7	8.1	8.4
Pier B	Monday	5.9	6.7	7.1	7.3
	Tuesday	6.9	6.2	6.9	6.9
	Wednesday	6.0	5.4	5.9	6.0
	Thursday	7.3	7.3	7.8	8.2
	Friday	7.3	7.4	7.9	8.4
	Saturday	8.9	7.9	8.2	8.7
	Sunday	8.2	8.8	9.0	9.2
Pier C	Monday	6.7	7.2	7.9	7.9
	Tuesday	7.5	6.5	7.3	7.4
	Wednesday	6.7	6.7	7.7	7.7
	Thursday	7.3	6.7	7.7	7.7
	Friday	7.8	7.8	8.5	8.7
	Saturday	9.0	8.7	9.0	9.8
	Sunday	8.7	9.0	9.7	9.8

From Table 6.3, it may be seen that the highest numbers of aircraft movements per stand (using the Aer Rianta definition of movement and extra hour), for each Pier, occur as follows:

- Pier A, Monday and Friday
- Pier B, Saturday and Sunday
- Pier C, Saturday and Sunday

61 Abstracted from Aer Rianta Review of ASA Runway Capacity Draft Report

62 An aircraft movement is either an arrival or departure

Table 6.4 shows, for each pier, and their two peak days for the week of 31st May / 7th June, the number of aircraft parked on stand, for each 'snapshot' hour, during the 24-hour operational day. The main features of interest (as shown in Table 6.4) are:

- Pier A is consistently used for overnight parking and most stands are occupied between for long-term parking between 2100 and 0600UTC.

- Less intensive use is made on Piers B and C for overnight parking, there appears to be less demand Saturday night / Sunday morning

Table 6.4 Parked aircraft at Piers A, B and C (Consultants Analysis 31st May / 6th June 2004)

Pier / Day / Stands	A / Mon./ 15 (Max.)	A / Fri. / 15 (Max.)	B / Sat. / 9 (Max.)	B / Sun. / 9 (Max.)	C / Sat. / 6 (Max.)	C / Sun. / 6 (Max.)
0000UTC	14	15	6	3	4	1
0100	14	15	5	2	4	1
0200	14	15	5	4	4	1
0300	14	15	5	4	4	1
0400	14	15	6	5	5	4
0500	15	15	9	8	5	6
0600	8	7	6	8	5	4
0700	7	7	6	8	6	3
0800	8	7	7	6	4	4
0900	7	6	6	7	2	2
1000	2	2	7	3	3	5
1100	9	11	6	8	5	5
1200	5	3	7	8	4	5
1300	6	8	7	6	5	3
1400	11	12	8	4	4	4
1500	10	9	5	7	4	3
1600	4	6	6	7	3	4
1700	6	6	4	4	1	2
1800	4	5	2	2	3	3
1900	4	3	5	3	2	3
2000	9	8	4	6	2	2
2100	10	10	8	9	5	5
2200	11	14	7	6	6	5
2300	15	15	5	5	1	5
0000 (+1)	15	15	4	6	2	5
0100 (+1)	15	15	3	4	1	5

- During the day Pier A has a mixture of peaks and troughs, for example, note the contrast between 1000 and 1100UTC.

- Generally constant use of Pier B is made during the operational day, the only significant quiet period being around 1800UTC.

- Use of Pier C seems to be rather more variable, but again there is a significant quiet period during the later afternoon, early evening.

Table 6.5 Occupation of Remote[63] Stands (Consultants Analysis 31st May / 6th June 2004) [Max. 20]

Time / Day	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
0000UTC	3	3	2	4	6	4	2
0100	2	2	1	3	5	3	2
0200	2	5	2	4	6	3	3
0300	2	5	2	4	6	4	3
0400	3	7	2	5	7	4	2
0500	2	9	5	7	9	4	2
0600	3	8	2	3	4	5	2
0700	2	2	1	1	2	1	2
0800	3	1	-	1	1	-	2
0900	2	-	-	-	1	-	1
1000	3	-	-	-	4	3	2
1100	4	1	-	3	5	4	4
1200	3	1	-	1	3	4	2
1300	2	2	1	2	1	3	2
1400	2	2	2	2	1	3	1
1500	2	2	2	2	1	3	-
1600	2	2	1	3	1	3	2
1700	2	2	1	2	1	3	2
1800	1	-	-	-	-	2	3
1900	1	3	2	1	2	1	3
2000	2	5	4	5	5	1	1
2100	-	2	2	2	2	1	2
2200	-	1	1	1	1	2	3
2300	-	2	1	1	1	2	3
0000 (+1)	1	1	2	2	2	2	3
0100 (+1)	-	1	1	1	1	2	2

[63] These include Stands 48 to 56 (Figure 6.3), 57 to 62 (Figure 6.3) and 70 to 75 (Figure 6.1); with a potential 20 stands available.

Table 6.5 shows, for each day of the week 31st May / 7th June, the number of aircraft parked on remote stands, for each 'snapshot' hour, during the 24-hour operational day. The main features of interest (as shown in Table 6.5) are:

- The largest demand for remote stands is around 0500 / 0600 UTC but even so less than 50% of the stands are occupied during this period.

- For the remainder of the operational, there is a low and fluctuating demand for remote stands. It would be expected that a greater use of remote stands is made during July and August, and in following years as traffic demand continues to build up.

6.3 Capacity constraints

In terms of stand availability there would appear to be no shortage of contact stands with a significant majority of aircraft operations having access to these stands and with a comparatively low level of remote stand use except during summer weekends.

Not only is there a variable daily demand for stands within individual piers but within each 24-hour period there are also demand variations. Aggregating stand demand for all three piers, there are significant departure waves at about 0500hrs, 1000hrs, 1400hrs and 2000hrs (all times in UTC).

There are of course some constraints and these effect aircraft operations, particularly in the early morning. Parked aircraft occupy a majority of contact stands; these aircraft form the first wave of early morning departures. There appears to be rather a delicate balance between available contact stands for overnight parking and such departures but this is not strictly a capacity problem as there are remote stand resources and buses available.

Aer Rianta has indicated that the latest season plan (July / August) confirms that the spare capacity for short turnaround operations is concentrated on Pier A. However, this Pier is unavailable for use by non-EU / non-CTA passengers due to non-segregation of arriving and departing passengers between the gate and immigration. Additional non-EU / non-CTA traffic would therefore have to be accommodated in Piers B and C or on remote stands.

There are a number of stands that are unavailable on occasions (and therefore under-utilised) because neighbouring stands are designated for wide-bodied aircraft.

Examples of potential unavailability include:

- Stands 12 and 14 (Pier A) must be vacant when wide-body Stand 13 is in use (and vice-versa)
- Stands 18 and 20 (Pier A) must be vacant when Stand 19 is in use.
- Stands 21 and 22 (Pier A) must be vacant during push-out / taxi-in of large aircraft into Stand 33 (Pier B)
- Use of Stands 41R, 43R and 45R (Pier C) each require two neighbouring stands to be vacant; likewise for (remote) Stands 50, 52 and 55.

Another problem linked to stand allocation and availability requires an insight into how the airline industry will develop in the future. Most short-haul airlines are rationalising their fleet types around the latest versions of the Boeing B737-800 and Airbus A320 / A321 families. There are a number of contact stands at Dublin that are too small for these aircraft types, for example, Pier A. Charter airlines are using larger aircraft, making use of economies of scale in order to remain competitive. A change in the bilateral arrangements for flights between Ireland and the United States could result in additional North Atlantic flights and therefore additional demand for wide-bodied stands located adjacent to Pier B[64]. Lastly, despite an apparent surplus of remote stands, concerns have been by the General Aviation (business jet) market about a shortage of stands for parking their market segment aircraft.

6.4 Conclusions

Although the use of remote stands is presently limited it may be expected that such use may increase in the future with the use of larger aircraft for both short-haul and long haul services. That itself is not a significant capacity constraint (in terms of total contact and remote stand availability) but an operational problem that the home-based operators (Ryanair and Aer Lingus) would prefer to avoid if at all possible. Aer Rianta have commented that '*when viewed in totality against short-haul aircraft fleet changes by Aer Lingus and Ryanair (complete by 2006), there will be a net reduction of four contact stands to accommodate these two airlines with a consequent loss of one stand and aircraft size restriction on three stands, including Stand 31 at Pier B*'.

With the exception of requirements for overnight parking, the brief analysis outlined in Section 6.2 shows that there is significant spare capacity on contact stands during the normal operational day for parking flights with a short turnaround (say 40 to 50 minutes). There is less potential capacity for accommodating long-haul operations that require a turnaround time significantly in excess of 60 minutes and these are the flights that are most likely to make increased use of remote stands in the future. Increased use of remote stands might well justify stand bussing being provided by a single independent supplier, as is often the case at other airports.

Taking the analysis a step further, and using data from Table 6.1, it may be estimated that the number of spare hours per stands would, for 100% short turnaround flights, be roughly equivalent to an additional 10 arrivals / hour and 10 departures / hour over a 15-hour day-time operational period. On this basis, runway capacity rather than stand capacity is the principal constraint on airside capacity.

To conclude this Chapter, it may be useful to reproduce comments from two of the respondents (selected from a rather limited response) to the questionnaire that was sent out during the course of the Study.

[64] The Dublin Airport Capital Investment Plan 2003 – 2006 includes a proposal for Apron Extension 5A (located near the North Apron) for the construction of 11 narrow-bodied or 5 wide-bodied plus one narrow-bodied aircraft stands

American Airlines indicated, "*We operate almost daily from a remote stand. This in itself works well, however a contact stand would of course be preferable. However, whilst we do operate to a remote stand, one of our greatest difficulties is having to accommodate inbound passengers as we are trying to board ….. the main difficulty we have with the apron is congestion….. refer to passenger busses driving from the terminal to the remote stand*".

First Choice indicated that "*stand allocation can be problematic if we are asked to move to a new location at the last minute or asked to hold for stands……all operators should adhere to the stand allocation policy and therefore this should alleviate the number of changes to the stand plan…….congestion on the ramp often leads to delays in stand allocation due to holding for stands*".

While the desire by Aer Rianta to provide contact stands for all customers is admirable, there is a finite resource in terms of the number of contact stands that are available compared with spare resources in terms of the number of remote stands available. The use of remote stands is not unknown at major international airports, for example, Frankfurt[65], Gatwick[66] and Madrid[67]. The stand allocation policy at Dublin (Section 6.2) favours, amongst others, those carriers that operate regular scheduled services on a year round-basis, have short turnaround times and therefore are making best use of a scarce resource. The 'losers' appear to be small turboprop operations and ad-hoc / season / weekly operations, the latter group being primarily charter flights. Charter flights also have a reputation for delays and therefore stand allocation can be problematic (First Choice comment above), for this reason many airports would prefer to allocate charters to a remote rather than a contact stand.

Therefore, in the context of stand capacity at Dublin, there appears to be little evidence that a transition from co-ordination to full co-ordination will actually provide an enhanced level of service for the relatively small number of users that have to use remote stands or that full co-ordination is necessary (in the context of stand capacity) to accommodate a growth in traffic demand forecast over the next three or four years.

65 In 2000 Frankfurt declared a total of 63 remotes stands compared with 50 (Terminal 1), 13 (Terminal 2) and 27 (Cargo)

66 In 2002 London Gatwick declared a total of 52 remote stands compared with 35 (Terminal South) and 19 (Terminal North). Completion of a passenger bridge linking Pier 6 with the North terminal will increase pier service for passengers from 78% to 92%. Total project cost was UK£15 million.

67 In 2002 Madrid declared a total of 152 remote stands compared with 41 contact / airbridge stands. The former figure should be considerably reduced on completion of the new terminal complex.

7 Review of slot coordination at Dublin Airport

7.1 Historic analysis of schedules facilitation at Dublin Airport.

Dublin was designated as a coordinated airport in September 2000. ACL was subsequently appointed as coordinator to facilitate voluntary schedules adjustments. Even though it is not a legal requirement under Regulation 95/93, a Coordination Committee was established, consisting of representatives of all the key stakeholders present at Dublin Airport. The Coordination Committee has been responsible for implementing several initiatives designed to resolve scheduling issues at the Airport. For example, the introduction of runway flexing options, the development of ad hoc slot clearance procedures within the terminal, the implementation of a slot overage process to provide additional flexibility to meet demand, the adoption of a prior permission procedure for general aviation and the formation of a Dublin Airport Runway Capacity Group to implement initiatives designed to maximise capacity.

In managing airline schedule requests, the coordinator seeks to achieve voluntary adjustments to schedules in order to achieve a more balanced distribution of daily departures and arrivals within defined terminal, stand and runway constraints. This is achieved through encouraging air carriers to re-schedule some departures and arrivals away from peak periods, hence reducing congestion and the probability of carriers incurring delays. Air carriers, for various reasons, can often refuse a request to re-schedule various departures. This means that efforts by the coordinator to de-peak schedules can sometimes be difficult to achieve. Statistics on the scale of re-adjustments required and refusals at Dublin from Summer 2001 to Summer 2004 are set out in Table 7.1 below.

Table 7.1: Schedule adjustments accepted and refused at Dublin from Summer 2001 to Summer 2004.

	S01	S02	W02	S03	W03	S04
ATM requests	109,566	101,622	64,967	103,840	65,310	106,739
Adjustments required	5,592	6,800	1,350	3,729	1,291	3,804
accepted	188	1,980	920	1,720	789	1,475
refused	5,404	4,820	430	2,009	502	2,329
Adjustments as % of ATM requests	5.1%	6.7%	2.1%	3.6%	2.0%	3.6%
Refused % of ATM requests	4.9%	4.7%	0.7%	1.9%	0.8%	2.2%

Source: ACL

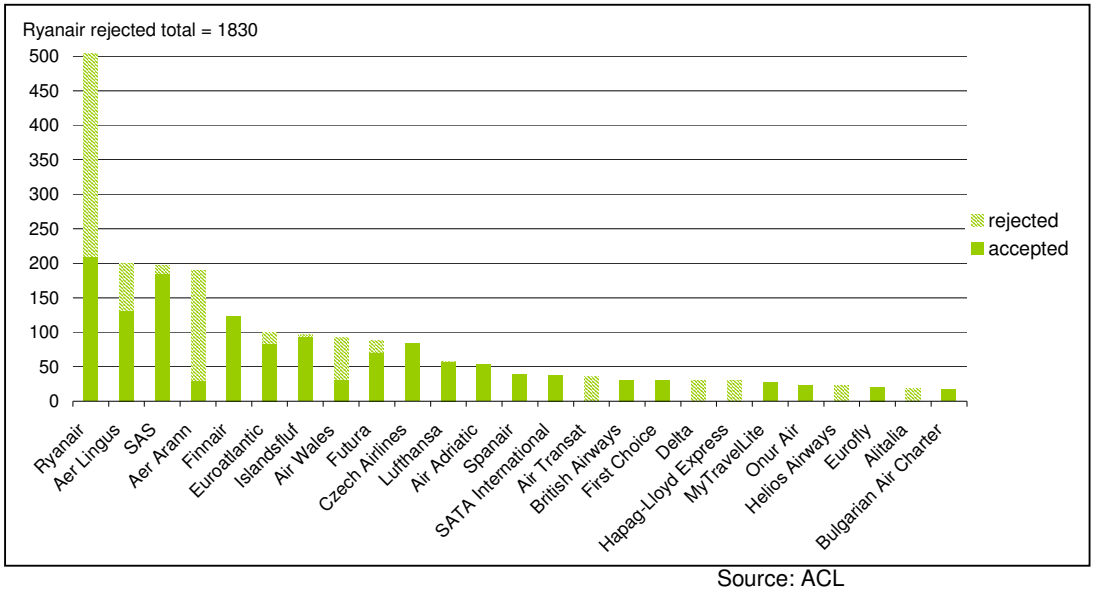
ATM requests are the timetabled departure and arrival times that are submitted to the coordinator. In most cases these requests are submitted prior to the start of the season, usually coinciding with the IATA slot coordination process. In some instances, however, airlines will submit re-plans (new schedule requests) close to the start of the season or even during the season itself. The coordinator, working within pre-determined capacity constraints, will seek to reduce any significant peaks in demand that can emerge from the

initial schedules submitted by airlines. In achieving this aim, the coordinator will request that a certain number of initial requests are re-adjusted to other times. These adjustments are then communicated to the airlines concerned, who then have the choice of either accepting or rejecting the coordinator's requests.

At Dublin, because of a greater degree of congestion in the summer season, particularly during weekends, the adjustments required are greater than in the winter season. However, in both seasons, the adjustments are not significant in relation to the total number of requested departures and arrivals. Due to higher levels of demand, refusals are more common in summer than in winter. In Summer 2004, for example, refusals amounted to 2.2% of total requested departures and arrivals, slightly higher than that recorded for Summer 2003.

For Summer 2004, the large number of refusals was accounted for by a late Ryanair re-plan. Figure 7.1 below shows the top 25 carriers operating at Dublin in terms of the number of adjustments requested.

Figure 7.1: Adjustments requested and rejected by carrier for Summer 2004 at Dublin.

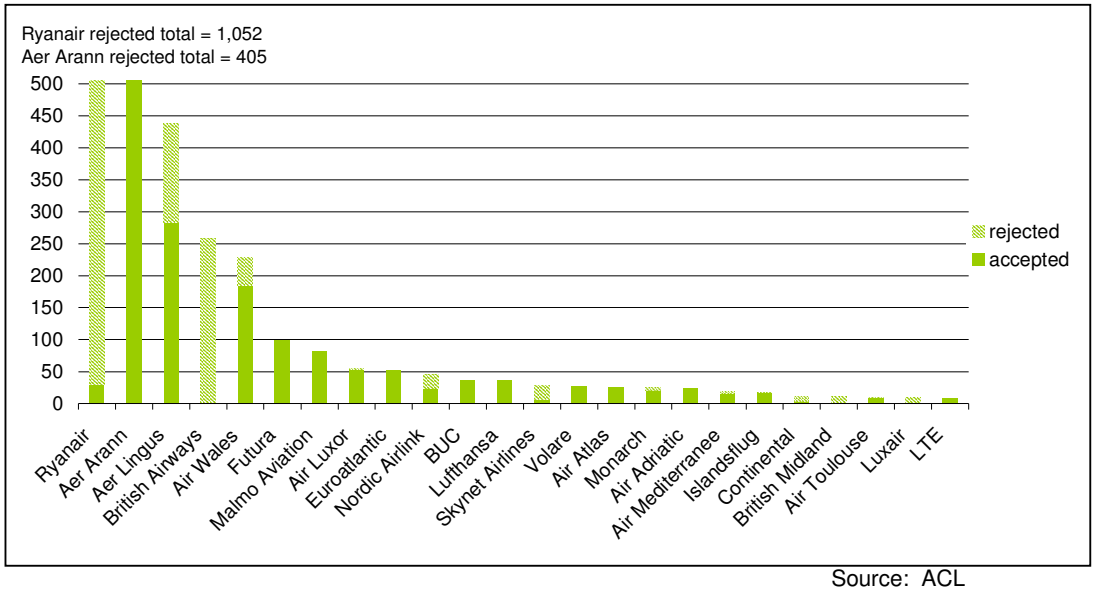


Source: ACL

Cooperation with the coordinator in accepting adjustments is to some extent dependant on the type of carrier operating at the airport. The highest number of refusals and the highest refusals in relation to acceptances are to be found amongst the base carriers Ryanair, Aer Lingus and Aer Arran. For Ryanair, in particular, its business model requires there to be a more intense utilisation of aircraft which means that it is less likely to cooperate in any voluntary re-scheduling request. Other low cost carriers have also tended to refuse adjustment. Bmibaby, for example, refused to accept all its required readjustments for Summer 2003. For Summer 2003, the situation was not too dissimilar to 2004 with Ryanair recording a high percentage and volume of refusals as well as Aer Arran (405) and Aer Lingus (155). These are illustrated in Figure 7.2 below.

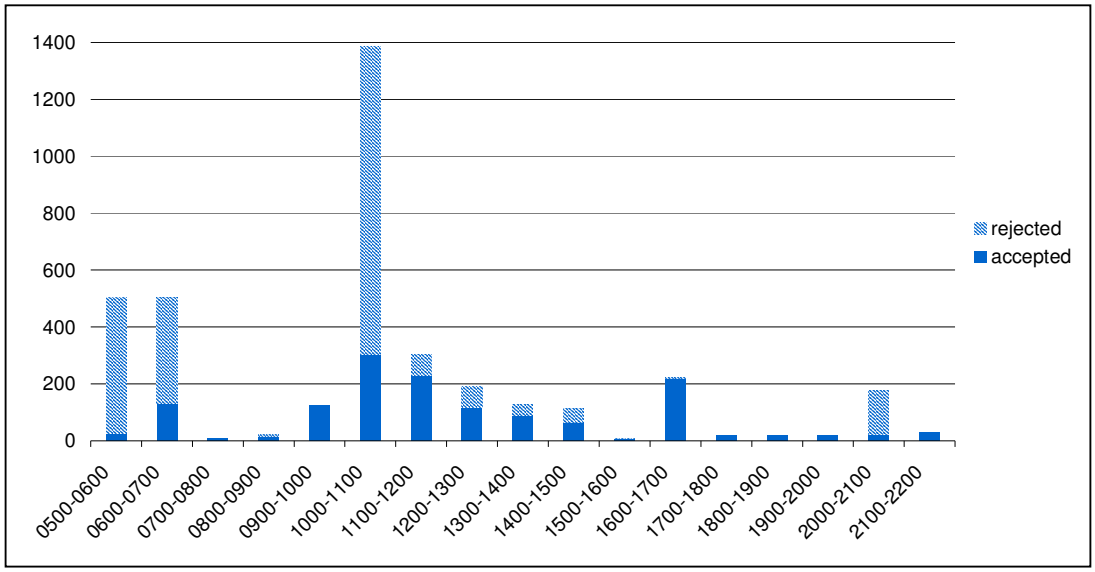
The scale of adjustments required also very much depends on the number of requests falling on peak periods of the day. Figure 7.3 illustrates the distribution of accepted and refused adjustments for summer season 2004 by hour of day. The largest number of adjustments requested in the 1000-1100 period reflects a particularly busy hour. Most of the refusals were accounted for by Ryanair who typically schedule a tranche of arrivals and departures during this period mainly associated with flights to and from short-haul destinations in their network. Furthermore, carriers, in particular Ryanair, will be less inclined to adjust schedules where departures and arrivals are scheduled to and from coordinated airports in their network where there is substantially less flexibility.

Figure 7.2 Adjustments requested and rejected by carrier for Summer 2003 at Dublin.



Source: ACL

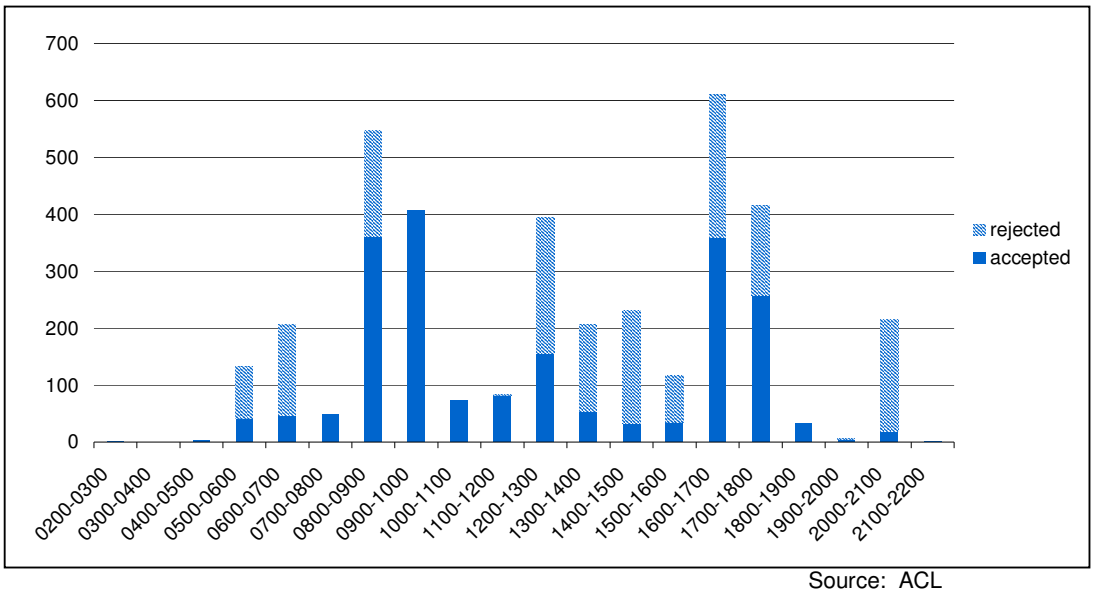
Figure 7.3 Adjustments requested and rejected by time of day for Summer 2004 at Dublin.



Source: ACL

The situation is also particularly critical during the 0500-0700 period where Dublin-based carriers are seeking to schedule the first wave of departures in the day. The distribution for Summer 2003 is actually quite different to Summer 2004 as shown in Figure 7.4

Figure 7.4 Adjustments requested and rejected by time of day for Summer 2003 at Dublin.



Source: ACL

In this instance, adjustments and refusals are concentrated in the mid-morning and late-afternoon periods, again most of them accounted for by Ryanair, Aer Lingus and Aer Arann. Indeed, what has been a particular feature of scheduling patterns at Dublin has been the significant change in the location of the peak between equivalent scheduling seasons. This has been largely due to major changes in Aer Lingus schedules brought about as a result of the airline's adoption of a "low cost" scheduling approach involving earlier and later departures and shorter turnaround times.

In most of the cases where adjustments are requested, the nearest available departure or arrival time, usually falls within 15 minute periods before or after the airline's requested time, so the degree of adjustment required is not significant. However, for some carriers, small changes in timing can affect utilisation, which can compromise the efficiency of a schedule.

7.2 The case for and against full coordination

The greater degree of certainty and stability granted by historic precedence, more control exercised by the coordinator in terms of managing demand and capacity, ensuring that slots are used efficiently, are the key advantages of full coordination. Furthermore, uncertainties caused by late re-plans are less likely to occur in a fully coordinated environment. For airlines, the key disadvantage of full coordination is the loss of flexibility in scheduling currently enjoyed under coordination status.

The IATA Worldwide Scheduling Guidelines effectively state that full coordination should be considered when all efforts at achieving consensus in scheduling between airlines and coordinators have failed, which is leading to unacceptable levels of congestion and delay.

The critical question is whether Dublin has reached this condition. In both Summer 2004 and Summer 2003, scheduling adjustment refusals only represented a relatively insignificant percentage of total airline departures and arrival requests. Indeed, the ratios for 2004 and 2003 are substantially lower than that recorded in Summer 2001 and 2002 where the volume of refusals was much greater (See Table 7.2). In winter seasons the schedule adjustment problems are less acute, accounting for less than 1% of total requested departures and arrivals. Evaluating the period 2001 – 2004, the trend has very much been towards greater cooperation with the coordinator rather than less.

One indication that voluntary scheduling is failing is if new entrant airlines are experiencing significant difficulties in scheduling services at their preferred times. Evidence to date suggests that new entrants have not experienced serious difficulties at Dublin while they have also generally been cooperative in agreeing to adjust their initial schedules in order to accommodate the Coordinator's requirements.

In Summer 2004, specific periods of the day have been identified as having particular problems of congestion in the terminal. Congestion occurs in the period 0630 - 0730, during the first wave of departures from Dublin, and between 1400 and 1530, although in the latter case the extent to which demand exceeds capacity is less than in the morning peak. On Saturdays these periods of congestion become more acute due to additional charter airline activity. However, the scale of congestion presently experienced and likely to be experienced in the next two summer seasons is not, in our opinion, severe or extensive enough to justify full coordination. Nevertheless, if there was a change in market conditions manifested in terms of additional transatlantic services and that the Coordinator could not achieve the necessary voluntary re-scheduling to avoid increased levels of congestion, then full coordination would be justified.

Accepting that the summer season is where scheduling problems are more likely to occur, it is possible to designate Dublin as fully coordinated for the summer season only. Precedents have already been set at some airports in Southern Europe. However, the seasonal peaks at those airports are significantly more pronounced than in Dublin, where the scheduling adjustment problem is only particularly acute on Saturdays. Coordination by day of the week or time of day has no precedent nor is it considered to be a practicable or efficient means of managing demand and capacity.

Our analysis of the scale and pattern of refused adjustments has shown that certain air carriers have not been particularly cooperative with the Coordinator at Dublin. The existing system allows air carriers to exercise a significant degree of flexibility in scheduling which would otherwise not be possible under the status of full coordination. Should there be a significant increase in the scale of refusals then this may compromise the efficiency of existing arrangements leading to a possible change of status in the future.

7.2 Stakeholder views on coordination status

To obtain the views of the main stakeholders on the Dublin's coordination status, we undertook an extensive consultation exercise with airlines, the ground handlers, the airport authority (Aer Rianta) and with other interested parties.

Personal interviews were carried out with eleven key stakeholders (see Appendix B) and a questionnaire (see Appendix C) was distributed to some 22 main airlines and handlers via Airport Operators Committee. All stakeholders were notified of the publication of the Draft Report by e-mail and were provided with a link to download this from the internet. In addition, a notice was placed in the 'Irish Times' inviting comment and given details on how to obtain the Draft Report.

Some eight responses were received from the questionnaire (five from airlines and three from handlers), although it must be pointed out that several recipients, including the main two home-based airlines at Dublin Airport, had already expressed their views during a personal interview. Just two direct responses were received (from Aer Rianta and a private individual) following the publication of the Draft Report, although several questionnaires were returned on notification of this.

Both the two main home-based airlines (who account for some 64% of Dublin's passenger traffic) expressed the view that full coordination was not necessary at the present time. The views of other airlines were mixed, whilst the handlers were in favour of full coordination. The main concerns were a lack of contact stands (particularly from ground handlers responsible for charter operations and from US airlines) and general congestion in the terminal, primarily in the departures concourse/security area at weekends.

7.2 Conclusions

In accordance with the project brief, we have reviewed previous studies and we have prepared our own assessment of the key areas of terminal, runway and stand capacity at Dublin Airport and we have examined the relevant arguments for and against full coordination put forward by the key stakeholders.

Our own capacity assessment suggests that terminal capacity is likely to be the key constraining factor, with our own estimates (based on the BAA methodology) giving an overall capacity of some 18-22 mppa, dependent on space standards per passenger. As such, we believe that the existing infrastructure is sufficient to cater from the expected traffic demand over the next three years, provided the existing scheduling constraints are applied and the level of flights operated at uncoordinated times is maintained at close to current levels.

As requested in the Terms of Reference, we consulted fully with all relevant parties. The airport authority, Aer Rianta, made its case in favour of full coordination in their response to the Draft Report and their comments have

been taken into account in the Final Report. We recognise that certain areas may appear to be congested at certain times although, as we have stated in Section 5, this can largely be overcome by improved operational control. In particular, we believe that congestion in the check-in area could significantly be reduced if airlines and handling agents opened up more desks at appropriate times. From an operational standpoint, the airport is not constrained by runway or by stand capacity. Although some percent of flights require a remote stand, this proportion is significantly lower than many European airports.

The main two home-based airlines are in favour of the present system which gives them some degree of flexibility to synchronize flight schedules at Dublin in line with those at fully coordinated airports. The current voluntary system does, however, rely on goodwill to ensure that the level of refused moves and uncoordinated flights is kept to an absolute minimum in the interests of other airport users. We have found some negative reaction to the current coordination system from a small minority of other airlines and from several handling agents, although these represent a comparatively small proportion of Dublin's overall traffic. A significant proportion of complaints related to difficulties in obtaining a contact stand, although it is not clear how this might be improved if the airport were to become fully coordinated.

Given these factors, we take the view that Dublin should retain its current (voluntary) coordination status for the immediate future. On the basis of the expected traffic demand and of possible future infrastructure improvements, we recommend that this should apply for a three year period, with annual reviews by the Regulator to assess its operability over the past 12 months, particularly in relation to two potential scenarios.

The first scenario is the possible effect of an increase in transatlantic flights from Dublin following the potential relaxation of the Shannon stopover under the US-Eire bilateral. Dependent on the timings of any possible new flights, we believe that there could be significant constraints on particular airport facilities, particularly at weekends in the Summer season. However, we feel that these can mostly be overcome, eg by appropriate scheduling constraints by limiting the number of transatlantic flights over given time periods. If absolutely necessary, these flights could be handled through the use of remote rather than contact stands, through changes in the check-in islands used for transatlantic flights and possibly by diverting passengers to US-based Immigration facilities rather than using the Dublin-based INS facility.

The second scenario concerns the level of refusals to flight changes requested by the Coordinator. Our analysis of the scale and pattern of refused adjustments suggests that certain air carriers have not been particularly cooperative with the Coordinator. The existing system allows air carriers to exercise a significant degree of flexibility in scheduling which would otherwise not be possible under the status of full coordination. Should there be a significant increase in the scale of refusals (as indicated, for example, in an annual review of the system), then this may compromise the efficiency of existing arrangements and could justify a change in the airport's coordination status.

Appendix A

Terminal capacity assessment

Summary of assumptions

Capacity Assessment Summary – Dublin Airport

Functional Area	ASA Assumptions		Assumptions in PM Team Report	Reference Source
Landside Facilities		NOTES		
Traffic modal split				
Car (private)	43.5%		43.5%	AR/PB survey 2002
Car (rental)	12.0%		12.0%	
Taxi	21.8%		21.8%	
Bus	22.4%		22.4%	
Other	0.4%		0.4%	
Vehicle change over time				
Private cars	10 secs			
Taxis	10 secs			
Buses / Coaches	20 secs			
DEPARTURES				
Total usable kerb length (m)	370		370	AR/PB survey 2002
% Pax using cars/taxis on dep (%)	46.6%		46.6%	AR / DTO 2001
Kerb dwell time – taxis	1.5 min		1.5 min	PB study 2002
Kerb dwell time – cars	2.5 min		2.5 min	
Avg. pax per car	2.2		2.16	AR / DTO 2001
Avg. pax per taxi	2.3		2.27	
	2.2 Avg.		2.2 Avg.	
Parking space per car (m2)	6.7 m2		6.7 m2	BAA Planning
ARRIVALS				
Total usable kerb length for taxis (m)	69m		69m	AR/PB survey 2002
Pax % using cars/taxis (%)	21.80%		21.80%	
Kerb dwell time – taxis	1.5 min		1.5 min	PB study 2002
Avg. nos. pax per taxi	2.25		2.25	
Arrivals level kerb length for bus/coach	140m		140m	AR/PB survey 2002
% Pax using bus/coaches (%)	17.9		17.9	AR / DTO 2001
Kerb dwell time - bus/coach	6 min		6 min	AR/PB survey 2002
Avg. nos. pax per bus	8		8	
Parking/manoeuvering kerb length - bus (m)	17.5m		17.5m	
Terminal Departure Areas				
Landside Departures Concourse				
Escorts per pax.	0.2	(i)	0.1	DTO survey 2001
Space req. per person (m2)	2.0 m2	(ii)	1.5 m2	BAA guidelines
Avg. pax dwell time	20	(iii)	36 min.	MRBI survey 2002
Avg. escort dwell time	10	(iv)	20 min.	
% people in non-commercial areas	90%	(v)	90%	Team assumption
Check-In Queuing Area (m2)	1.5 m2		1.5 m2	Team assumption
Check-In Desks	50% peak hr. pax in 20mins		50% peak hr. pax in 20mins	Team assumption
Check-In Desks (std.)	100 secs./ pax	(vi)	85 secs./ pax	Dublin airport 2002

Check-In Desks (handbag only)	80 secs./ pax	(vii)	60 secs./ pax	
Check-In Desks (no.)	158 (142 std + 16 hdbg.)		158 (142 std + 16 hdbg.)	Dublin airport
% of desks open @ peak times	75%	(viii)	67%	Dublin airport 2002
% of economy pax	90%		90%	Dublin airport
% of pax with no baggage	5%		5%	
Self check in kiosks	38			
Self check in time	60 secs.	(ix)		
% of desks open @ peak times	90%			
Checked Bags per pax.				
0 bags	37%		37%	DTO survey 2001
1 bag	57%		57%	
2 bag	4.6%		4.6%	
2+bags	0.61%		0.61%	
Transatlantic pax.	1.2		1.2	Aer Lingus
Security screening				
No. X-ray machines available	10		10	Dublin airport
Peak proportion of pax using machines	A=60%, B=40%		A=60%, B=40%	
Handbags per pax.	1.9		1.9	Dublin airport
Processing pieces per hr.	450		450	
Avg. check time per pax.	30 sec.		30 sec.	Dublin airport
Queue depth (m)	0.8m		0.8m	BAA Planning
Security Desks Queuing Area (m2)	0.6 m2		0.6 m2	BAA Planning
Total time for Security Check	7 min max.		7 min max.	Dublin airport
Airside Departures Concourse				
Space req. per person (m2)	2.5 m2	(x)	2.1 m2	BAA Planning
% people in non-commercial areas	70%	(xi)	95%	Team assumption
% people in CIP/Business lounge, not in concourse	5%		5%	Dublin airport
Avg. Long haul pax dwell time	67mins		67mins	Dublin airport 2002
Avg. Short haul pax dwell time	45mins		45mins	
% Long haul pax	7.1%		7.1%	Dublin airport
% Short haul pax	92.9%		92.9%	
Gate Lounges				
Departure Gate Holding Lounge Space per pax. (m^2)	1.0 m2		1.0 m2	IATA std.
Largest Gate Holding Lounge Pier A (m^2)	200 m2		200 m2	Dublin airport
Largest Gate Holding Lounge Pier B Upper main (m^2)	104 m2		104 m2	
Largest Gate Holding Lounge Pier B - I.N.S. area (m^2)	314 m2		314 m2	Dublin airport
Largest Gate Holding Lounge Pier C (m^2)	282 m2		282 m2	
% of pax at gate lounge (%)				
Pier A	100%		100%	Team assumption
Pier B	95%		95%	
Pier C	95%		95%	
Immigration checks				
Desk nos	8		8	Dublin airport

US Immigration Desks avg. processing time	45 secs		45 secs	
Terminal Arrivals Areas				
Passport control avg. processing time	5 min. max.		5 min. max.	Dublin airport
Passport control Queuing Area (m^2)				
Pier A	52 m2		52 m2	
Pier B	172 m2		172 m2	
Pier C	239 m2		239 m2	
Passport control avg. processing time				
Pier A	CTA 3 secs, others 20secs		CTA 3 secs, others 20secs	Team assumption
Pier B	CTA 3 secs, others 30secs		CTA 3 secs, others 30secs	
Pier C	CTA 3 secs, others 30secs		CTA 3 secs, others 30secs	
Baggage Reclaim				
Avg. pax. occupancy	25 min	(xii)	30 min	Team assumption
Reclaim Unit Queuing Area (m^2)	1.0 m2		1.0 m2	BAA Planning
% defined as thro' routes	25%	(xiii)	30%	Team assumption
Wide body units (no)	2		2	IATA calc req.
Narrow body units (no)	8		8	
Max. % of flight present	80%		85%	Team assumption
% pax with bags	70%		70%	
Avg. Widebody Reclaim Unit occupancy	50 mins.		45 mins.	
Avg. Narrowbody Reclaim Unit occupancy	35 mins.		30 mins.	
Customs Hall				
Customs Desks	8		8	Dublin Airport
% pax to be checked	5%		5%	
Customs check avg. time	2.5 mins		3 mins	
Customs Desks Queuing Area (m^2)	1.6 m2			
Arrivals Concourse Area (m^2)				
Escorts per pax.	0.3	(xiv)	0.186	Dublin airport / DTO
Avg. occupancy per pax.	12 mins.		9 mins.	Dublin airport
Avg. occupancy per escort	36 mins		36 mins	
Space per person	2.0 m2	(xv)	1.5 m2	BAA Planning
NOTES :				
i) PM/TPS assumption too low	vi) Measurements made by PM/TPS team		xi) Allows for Aer Rianta observations	
ii) Allows for unusable areas	vii) Measurements made by PM/TPS team		xii) PM/TPs team assumption excessive	
iii) Aer Rianta comment on Dr Hynes report	viii) Takes account of Dr Hynes observation		xiii) PM/TPS detuned space excessive	
iv) Illogical that it differs from passenger dwell time	ix) Being installed		xiv) PM/TPS team assumption too low	
v) Dr. Hynes report and Aer Rianta observation	x) Allows for unusable space		xv) Allows for non-usable space	

Appendix B

List of consultees

LIST OF CONSULTEES

Personal Interviews

Airport Coordination Ltd (ACL)	James Cole
Airport Coordination Ltd (ACL)	Peter Morrisroe
Airport Coordination Ltd (ACL)	William Pearson
Airport Coordination Ltd (ACL)	Paul Simpson
Servisair/Globeground	John Murphy
Servisair/Globeground	Bernard Farrell
William Hynes & Associates	William Hynes
Aer Rianta	Robert Hilliard
Aer Rianta	Margaret Sweeney
Aer Rianta	Elaine Jones
Aer Rianta	Declan Ryan
Dept of Transport	Liam Duggan
Commission for Aviation Regulation	William Prasifka
Commission for Aviation Regulation	Kieran Baker
Aer Rianta	Brendan Daly
Execair	Conrad Phillips
Irish Aviation Authority	Terry Treanor
Ryanair	David O'Brian
Ryanair	Shay Warren
Dept of Transport	Liam Daley
Dept of Transport	Robin McKay
Dept of Transport	Paddy Campbell
Aer Lingus	Stephen Kavanagh
Dublin Airport Operators Committee	Dympha O'Dywer

Questionnaires (Recipients)

Aer Lingus	Adrian Dunne
First Choice	Grainne McCollum
Monarch Airlines	David Simpson
Air France	E.O.Scott
Malev	Station Manager, Dublin Airport
Ryanair	A.Rowe
US Airways	Andy Kynoch
DHL	Karen McLoughlin
British Airways	Irene A.Flynn
Cityjet	David Finn
US Airways	Therese Jager
DHL	Gerry Doyle
SAS	Matt Danahen
Aer Arann	Suzanne O'Brian
Iberia	Station Manager, Dublin Airport
Czech Airlines	Station Manager, Dublin Airport
Delta Airlines	Joan M.Carrick
BMI British Midland	Sharon Okane
Aviance	Stephen Preece
SHP	R.Copeland
Servisair	Sharon Greenhalgh

Air Contractors	H.O'Reilly

Other Consultees (telephone interviews etc)

Air Transport Users Committee	Tadhg Kearney

Appendix C

Stakeholder questionnaire

DUBLIN AIRPORT CAPACITY STUDY

Airline Questionnaire

Current Operations ex-DUB

Please outline your current operations ex-DUB in terms of destinations, fleet types and frequencies (eg DUB-STN – 737 x 4 weekly – W03/04 – x5 weekly – S04 etc)

Future Expansion Plans

What percentage increase (or decrease) in your total annual passengers and flight movements (ex DUB) do you expect over the next four years (+/- % from previous year) ?

	2005	2006	2007	2008
Total Passengers	____	____	____	____
Total Flight Movement	____	____	____	____

Please indicate any proposed or potential changes in your fleet structure over this period

---

Airport Operations At Dublin Airport

What are your most significant operational problems at Dublin and what would you like to see done to alleviate them ?

Terminal Building

Please detail the areas in the terminal building where you believe there are capacity constraints and please advise on any solutions you feel might improve the problems.

Runway(s), Aprons and Taxiways

Please provide similar information to that requested above for the apron, taxiways, runway and any immediate airspace.

Capacity Declaration

The present runway capacity declaration (up to 44 movements per hour) has been determined by NATS based on a simulation model assuming an average 8 minute delay criteria. This is lower than other capacity assessments at UK airports. Would you be prepared to accept possible increase in runway capacity if this average delay were increased to 10 minutes per flight ?

Slot times

Do you experience any particular difficulties obtaining slots through the Airport Coordinator at your requested times or at times acceptable to you ? If so, please provide details.

Coordination Status

What are your views on the possible introduction of a fully coordinated status for the airport?

Signed

Name _____

Position _____

Airline _____

Date _____

Thank you for your cooperation. Please send your completed questionnaire to Mr Peter Forbes

E-mail: pforbes@alanstratford.co.uk

Fax: +44 20 7939 9901

Appendix D

Study brief

Commission for Aviation Regulation
An Coimisiún um Rialáil Eitlíochta

Alexandra House
Earlsfort Terrace
Dublin 2
Tel: 00-353-1-6611700 Fax:-00-353-1-6611269
Web: www.aviationreg.ie. E-mail info@aviationreg.ie

DUBLIN AIRPORT CAPACITY ANALYSIS

PROJECT BRIEF AND TERMS OF REFERENCE

BACKGROUND

Origins of the Commission for Aviation Regulation

The Commission for Aviation Regulation (*the Commission*) is a body corporate established under the Aviation Regulation Act, 2001 ("the Act").

The Commission performs a range of regulatory and licensing functions in relation to the aviation and travel industries in Ireland. Further information on the functions of the Commission may be accessed at www.aviationreg.ie.

The Commission's functions in relation to slot allocation

Section 8 (1) of the Act provides that the Commission is the competent authority in Ireland for the purposes of Commission Regulation (EEC) No. 95/93 on Common Rules for the Allocation of Slots at Community Airports ("the Regulation") other than the functions of the coordinator.

Section 8(2) of the Act provides that the Commission also has the function of appointing a coordinator under Article 4 of the Regulation.

History of schedules facilitation at Dublin Airport.

Up to September 2000, Dublin Airport had SFA status, and schedules facilitation was carried out between the airlines operating at the airport, a process facilitated by Aer Lingus.

In September 2000, the then Minister for Public Enterprise designated Dublin Airport as coordinated and appointed a coordinator as provided for under the Regulation. Following a public consultation process spanning late 2001/early 2002, the Commission reappointed the existing coordinator for a period of three years, expiring in March 2005.

Request by Aer Rianta for designation of Dublin Airport as fully coordinated.

Following the receipt and consideration of representations from the Dublin airport authority, Aer Rianta, that full coordination of Dublin Airport was necessary on the grounds that the capacity of the airport was insufficient to for future/planned operations, the Commission decided to undertake a thorough capacity analysis of Dublin Airport in the manner provided for under Article 3 of the Regulation.

Possible changes to regulatory and legal basis for the analysis.

Given that coordination arrangements for Summer 2005 must be finalised before October 2004, the principal objective of this analysis is to inform the Commission's future view on Aer Rianta's request for full coordination of Dublin Airport in time to meet that timescale.

This capacity analysis is being undertaken against the background of probable changes to the Regulation, as evidenced by Transport (TTE) Council agreement on 5 December 2003 on the text of a Proposal to amend the Regulation. Terminology used in this project brief and the terms of reference reflects the current arrangements.

In the event that the Proposal to amend the Regulation comes into effect in a manner which conflicts with the general objectives of this capacity analysis or the manner in which it is being undertaken, the Commission reserves the right to suspend this procedure and to progress the matter in the light of the requirements of the amended Regulation.

Call for tenders

Persons who can demonstrate that they possess relevant experience in carrying out capacity analysis for the purposes of the Regulation are invited to tender for the contract to carry out the required analysis, in conformity with the terms of reference of the study set out below.

Tenders should include full information on the qualifications and prior experience of those persons who will conduct the analysis, projected completion date of the study and anticipated costs/methodology of the study.

Prospective tenderers are advised that the contract for the assignment will be awarded on the basis of the most economically advantageous tender (MEAT) and that the lowest priced tender may not automatically succeed. The MEAT criteria to be applied will be:

- Declared competence
- Prior experience and reference studies
- Delivery date
- Total cost/ charge basis

Sealed written tenders should be submitted to the Commission offices no later than 12.00 midday on 27th February 2004, marked "Tender for Dublin Airport Capacity Analysis", addressed for the attention of Mr Kieran Baker. Faxed or electronically transmitted tenders will not be accepted and any so received will be excluded from the evaluation process.

Tenderers should also be aware that:

- evidence of tax compliance issued by the Irish Revenue Commissioners will be a prerequisite to the award of the contract for the assignment,

- the provisions of the Act in relation to disclosure of interests will apply to the successful tenderer, and

- the Commission reserves the right not to award the contract in the event that no suitable tender is received.

Terms of Reference

- To conduct a capacity analysis of Dublin Airport, Ireland, in accordance with established principles and commonly recognised methods, and in a manner consistent with the requirements of Regulation 95/93

- To consult fully with all relevant parties (including but not limited to Aer Rianta, airlines serving or planning to serve Dublin Airport, ground handlers operating or planning to operate at Dublin Airport and the Irish Aviation Authority) necessary to effectively achieve the objectives of the study

- To review the current coordination status of Dublin Airport and to make recommendations as to its continued and future appropriateness

- To examine all existing terminal (both landside and airside) and aeronautical infrastructure at Dublin Airport and to determine, taking into account such environmental and other constraints as apply to Dublin Airport, whether it is adequate to meet actual and reasonably anticipated passenger and operational demands and if not, to make recommendations as to how these demands might be managed

- To determine if constraints, if such are identified, can be overcome in the short term by improved, new or modified infrastructure, operational changes, or other changes and the time frame within such improvements, modifications or changes can be implemented

- To make recommendations in relation to the future coordination status of Dublin Airport, giving likely time scales of major eventualities

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