16th February 2009

DAA Response to the Commission for Aviation Regulation's Consultation on the Decisions of the Aviation Appeal Panel

I. INTRODUCTION

1. In response to the request of the Commission for Aviation Regulation (CAR or the Commission) dated 11 February 2009, Dublin Airport Authority (DAA) sets out in this document a further submission on the capacity of Terminal 1 at Dublin Airport. This paper has been compiled in conjunction with DAA's expert advisers ARUP, an international firm of designers, engineers, planners and business consultants who have a considerable reputation and expertise in the design and planning of airport terminals including the issue of capacity. DAA has been advised in particular by Ms Regine Weston, the CV of whom is attached as Appendix 1.

2. DAA has in this submission addressed the two questions which the Commission has identified, namely:

   (a) What is the busy-hour capacity of T1, and how do Pier D, Area 14 and T1X affect this busy-hour capacity?

   (b) How does this busy-hour capacity convert into an annual throughput capacity?

3. DAA notes that the questions raised by CAR and considered in this submission follow the view of the Appeal Panel in the Ryanair determination that "*in order to properly assess the proper size of Terminal 2 (and accordingly the appropriate parameter for Box 2) the Commission must first establish and identify clearly the capacity of Terminal 1"* (para. 8.4) and "*Only having identified the capacity of Terminal 1 can a view be taken as to the appropriate size of Terminal 2 by reference to the needs of airport and airport users. It is not clear to the Panel either from the Determination under Appeal nor from the Appeal process as to what precisely the Commission regarded as the capacity of Terminal 1"* (para 8.5).

4. Mindful that the Appeal Panel has asked the Commission to set out clearly its reasoning in relation to the capacity of T1, DAA trusts that on the basis of the evidence provided in its submission of 21st January and this response, the Commission has cogent evidence at its disposal to confirm that the planning busy-hour capacity of T1 is 3650 departing peak-hour passengers and that the annual throughput capacity of the terminal is 18-20 million passengers per annum ("mppa"). It will also enable the Commission to further justify its conclusion on the basis that DAA carried out its calculations in a robust and reasonable manner that is consistent with the approach designed by experts to calculate the capacity of airport terminals.

5. It has been, and continues to be, DAA's understanding that in its Determination the Commission regarded the capacity of Terminal 1 to be 18-20 mppa[1]. DAA regrets in this regard that no evidence was put before the Panel to support this assessment and to refute Ryanair's allegation that the capacity of Terminal 1 is 26 mppa. It is particularly regrettable that no evidence was presented to contest Ryanair's untenable allegation that T2 should be designed solely as an "increment" to T1 without reference to other capacity

[1] The outcome of the assessment of T1 capacity undertaken by the Commission's consultants WHA in 2005 is consistent with DAA's 18-20mppa assessment (though DAA has noted problems with the nature of the methodology employed by WHA). Furthermore, the "comfortable capacity" of T2 was initially assessed by CAR and RRV as 18.5mppa for the purpose of implementing the unitised approach to depreciation for T2. This estimate was subsequently revised upwards to 21.5mppa in the Interim Review decision (based on an assumption about T1X which did not materialise). This figure exceeds the upper range of what DAA believes to be the appropriate capacity level.

and design imperatives. It is noteworthy that DAA was not provided with a copy of Ryanair's appeal or given an opportunity to contest these claims before the Panel. This unsatisfactory procedure led the Appeal Panel to consider the Ryanair submissions in isolation and without the benefit of a full and complete understanding of the issues concerning terminal capacity. DAA welcomes the fact that the Commission is not in the same position and will be able to deal with the issue having regard to the correct position concerning capacity at Dublin Airport.

6. DAA is concerned that the thrust of Ryanair's position is that a second terminal is not required at Dublin Airport and, consequently, that DAA should not be remunerated for T2 above what it considers is the "incremental" capacity required. Ryanair's position is entirely without merit. Although the chronic overcrowding at Terminal 1 was the primary driver behind the decision to build a second terminal, it does not follow that the second Terminal should be designed as a direct increment to the capacity of the first. To do so would completely ignore an essential aspect of the determination of the required capacity for T2, namely that the capacity of each of T1 and T2 is a function, inter alia, of the requirements of carriers based (or to be based) in those facilities.[2] The intention is not only to address the deficiencies for current users but also to allow for the needs of prospective users.

7. Ryanair has also proffered the ludicrous notion that T1 can sustain further traffic growth – a suggestion that even an occasional passenger at Dublin Airport would find unbelievable. The decisions to develop capacity at Dublin Airport, including the government's directions regarding the need for a second terminal, were based on the overwhelming body of evidence that Dublin Airport is congested and that such congestion has adverse consequences for the travelling public, the growth of competitive air travel services from Dublin Airport, the tourism industry and the economy as a whole. DAA refers further to its previous submissions to the Commission, in particular DAA's Statement of Case dated 7th March 2007.

8. By way of summary:

- The lack of terminal capacity and resulting congestion in T1 has been a widely documented issue since the early part of this decade and has generated very critical airline, public and media comment. The passenger experience was unpleasant at times and the absence of capacity was a hindrance to the development of competitive air travel to and from Dublin Airport.

- This resulted in calls from a range of parties, notably including Ryanair, for the construction of a new terminal, dating well before government decision to mandate the construction of T2.

- DAA's ability to address capacity shortfalls was delayed while Government considered the alternatives for delivery of capacity in the early years of this decade. (Including, in response to a government initiated request, the submission

[2] On the basis of ARUP's analysis, the peak planning flow for Terminal 2 is 4,200 passengers per hour. ARUP developed the core peak hour demand profile using the number of based aircraft implicit in the range of peak day schedules provided for each of a range of forecast scenarios. The peak hour planning flow was established by assuming a certain percentage of the based fleet departing in the peak hour, applying an agreed aircraft load factor (85%), growing the peak hour at an agreed rate (4% annually from 2010 to 2016 and then at 3.8% thereafter), taking the average of the peak hour demands so calculated, applying a 5% and 10% tolerance to allow for forecasting uncertainty and then selecting a figure in the mid to upper range. At the midpoint of the initial phase (which allows for the "clear" period of operation of approximately 5 to 7 years), this equates to a peak planning flow of 4,200.

by various parties, including Ryanair, of expressions of interest to provide a new terminal). The question has never been whether a new terminal was needed but rather how it would be provided.

- Ultimately, the Government's Aviation Action Plan (18 May 2005) mandated DAA to provide a new pier for aircraft stands by 2007 and to deliver T2 by 2009.

- The resulting capital programme was consulted on, independently verified and subsequently reviewed by CAR. The Minister for Transport also conveyed his views to CAR on the Terminal 2 development.

- The methodology used for the sizing of T2 was found to be in line with best practice by the Government's independent verification consultants: *"The approach to sizing of the terminal and key systems follows very closely the guidance contained in the IATA Airport Development Reference Manual".*

9. As explained in further detail in this submission, the clear evidence is that the capacity of T1 is 18-20 mppa.

10. In this regard, DAA's approach to calculating terminal capacity has been designed in accordance with international best approach and its extensive experience of terminal management. The following principles in particular have been followed for the purpose of assessing the capacity of Terminal 1 in the context of assessing the required size of Terminal 2:

    - DAA has taken full account of the need to ensure an appropriate level of service in all parts of T1 and T2. DAA has adopted IATA LOS C as the appropriate level of service and this is recommended as a minimum design objective denoting good service at a reasonable cost.

    - DAA had adopted appropriate planning standards and, as re-iterated to the Commission on many occasions, has proceeded in a way that will avoid designing existing under-capacity into new facilities – which would undermine the efficiency of the proposed capacity expansion plans and be to the detriment of all users in the long-term.

    - DAA has relied on expert advice and the application of robust and reasonable industry standards.

    - DAA has taken a conservative approach to the expansion of capacity at Dublin Airport which adequately protects users from having to pay for facilities that are not reasonably required.

11. There is absolutely no doubt that the approach proposed by Ryanair does not stand against such standards. Ryanair's unsupported contentions regarding the capacity of T1 are obviously driven by Ryanair's objective to secure its own market position at Dublin Airport to the detriment of current and potential future competitors. DAA trusts that the Commission will reject Ryanair's superficial and flawed approach to capacity assessment and, consistent with its experience in the industry and its role as industry regulator, will take a robust and credible approach to the calculation of capacity of T1.

12. DAA would point in this context to the comments of the Appeal Panel which has made clear that the Commission, before rejecting the expert evidence put forward by DAA, must provide clear transparent reasons as to why it is doing so. In other words, simple

claims by Ryanair or other parties cannot be considered an adequate basis for disregarding the expert evidence of DAA. DAA submits that there is no reasonable basis on which the Commission could rely to substitute DAA's evidence on T1 capacity with other (less robust) estimates. DAA evidence is set out in this document, its submissions dated 21 January 2009 and in response to the methodology of WHA.

13. DAA looks forward to CAR setting out transparently the capacity of T1 and believes that this will avoid any further misunderstanding on the part of Ryanair or other parties as to the capacity of the terminal and effectively prevent further litigation on this point.

14. The outcome of the regulatory process, DAA's consideration of that outcome, and its regard to the government mandate to provide a second terminal, led the company to proceed with the investment in T2. The investment is now effectively complete. Setting aside its conclusions to date and the evidence on which it based those conclusions would grossly disadvantage DAA and could inflict grievous financial damage on the company when it is not in a position to reverse decisions taken in good faith on the basis of its understanding of the regulatory outcome. It would also be completely unjustified based on the evidence previously submitted to CAR and summarised again in this submission. The regulatory risk introduced by such an approach would undermine the incentive properties of the regulatory system.

15. In the remainder of this document, DAA responds to the two questions raised by the Commission and also sets out an additional note on Ryanair's calculation of T1 capacity in its response to CP1/2009. DAA remains at the disposal of the Commission should it require additional information.

II Response to CAR Questions

What is the busy-hour capacity of T1, and how do Pier D, Area 14 and T1X affect this busy-hour capacity?

16. It is important for the purpose of this question to distinguish between actual throughput and capacity. Throughput refers to the actual number of passengers processed through the airport in any given period. By contrast, the design capacity (commonly termed the busy-hour capacity), in the context of an airport, refers to the maximum number of passengers which the airport is designed to accommodate during the designated peak hour] while achieving a defined level of service. The busy-hour capacity accordingly depends on the required level of service (IATA recommends LOS C to be the minimum level that a terminal should be planned for) and the demand for airport services. In this regard, as DAA's submissions of 21st January explain, the relationship between demand and capacity is a dynamic one which changes over time. Typically it is economically efficient to increase capacity in a series of increments and, in order to plan when and how large these increments should be, the demand at the point in time when new capacity becomes available must be considered as well as the point before the next increment of capacity can be delivered, with the planning horizon set mid-way between the two. .

17. The Planning Capacity is different from, and should not be confused with, the airport's Declared Departures Peak Hour Capacity, which is used in the preparation of flight schedules in the context of DAA's status as a coordinated airport. (In February 2007, CAR designated Dublin Airport as a coordinated airport but since 2001 Dublin Airport has had a coordination committee in place to act as a forum where key stakeholders (Airlines, Air Traffic Control, Airport Authority, Slot Coordinator) discuss and agree Declared Capacity limits for the next scheduling season. ACL has then used the seasonal declared capacity limits in the preparation of flight schedules). In particular, the Declared Capacity is not set so as to achieve a defined level of quality of services throughout the airport.

T1 Busy-Hour Capacity

18. From an airport planning perspective, the busy-hour capacity of T1, taking into consideration Pier D, Area 14 and T1X, is 3650 peak hour departing passengers. This is based on the following:

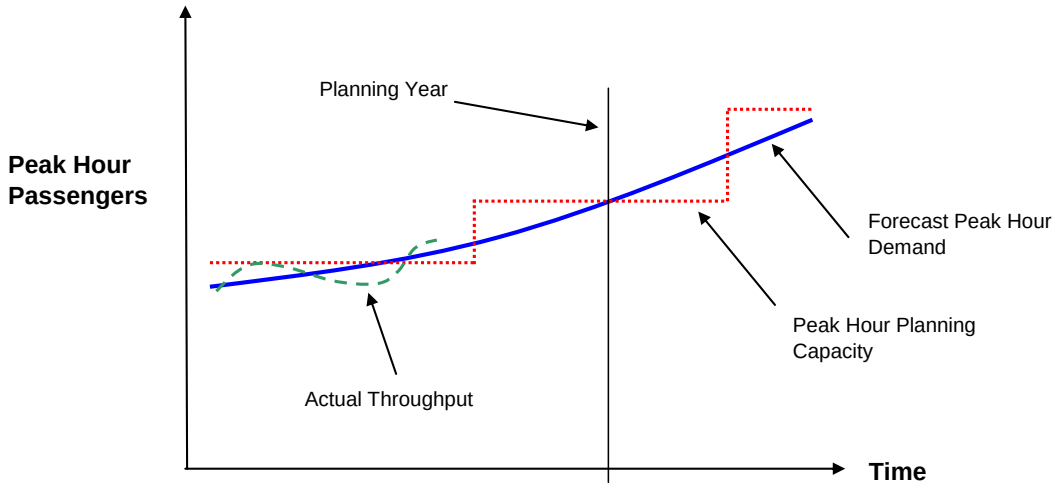
- Provision of a minimum of IATA Level of Service (LOS) C in **all** areas of the T1. IATA Level of Service C not only imposes a series of space standards but it also requires *"Conditions of stable flow, acceptable delays and good levels of comfort"*[3]. The same document notes that *"Level of Service C is recommended as the minimum design objective, as it denotes good service at a reasonable cost".*

- The Summer 2009 Declared Departures Peak Hour Capacity is 4050 which includes Pier D and Area 14. This Seasonal Declared Capacity does not allow T1 to meet IATA LOS C in **all** areas. The photographs attached at Appendix 2 show the actual levels of congestion experienced at busy hour levels at a time

[3] IATA Airport Development Reference Manual 9th Edition

when the recorded throughput was well below the declared capacity in summer 2007. As discussed and agreed with the Dublin Airport Coordination Committee, the meetings of which CAR attends, the Declared Capacity is based on a spreadsheet model which considers the capacity for each functional area as a whole. For example, that effectively means that while the average LOS in the check-in hall is C, some areas may experience LOS B, while other areas experience LOS D (or worse) – all within the same busy-hour. While this approach is understandable in a capacity constrained environment, it is not an acceptable planning standard for the future of this terminal in an unconstrained environment. Indeed, because IATA LOS C is not being achieved in all areas, DAA has had up to 120 Terminal Service Agents deployed in the airport over the last three seasons to help manage queues and avoid circulation areas becoming saturated and the terminal coming to a standstill. After the opening of T2, the objective is to remove the constraints and extraordinary measures in place in T1 to allow it to function as a robust and stable facility. This means that the planning busy-hour capacity must be less than the current declared value.

19. How then does one derive 3650 as the planning busy-hour capacity? In an airport planning context there are a number of basic principles. The first is to establish a planning year along the demand curve midway between points at which new capacity increments are to be brought on line. Clearly, there will then be a period of time before the planning year where the demand will be lower than the planning busy-hour capacity and a period of time after the planning year when the demand exceeds the planning busy-hour capacity (during this period there will be lower levels of service experienced than the planned target). This is illustrated in the following diagram.



20. At Dublin Airport, Terminal 2 Phase 1 is the next capacity increment, followed by Terminal 2 Phase 2. As such, the relevant planning period is 2010-2016 with 2013 as its midpoint.

21. As 4050 is the current Declared Capacity of T1, it is reasonable to use this figure as an upper limit for the facility, which would coincide with the end of the planning period (2016).

22. As noted in tab 1.4.1 of the "Appendix to DAA CIP Review Response.xls" provided to CAR and their consultants on May 1, 2007, the forecast predicts that the Departures Peak Hour for the airport will increase by approximately 4% pa between 2013 and 2016 or around 12% in total over the three years. Thus the planning busy-hour capacity which would occur at the midpoint of the planning period would be 90% (i.e. 100%/112%) of the current Declared Capacity or 3650 (90% x 4050 ≈ 3650) peak hour departing passengers.

How do Pier D, Area 14 and T1X affect this busy-hour capacity?

23. The Commission has requested that parties specifically address how Pier D, Area 14 and T1X affected the busy-hour capacity. The table attached at Appendix 3 sets out the changes in declared capacity for arrivals and departures over the six seasons since summer 2007.

24. As can be seen from the table, Area 14 was opened during the Winter 2006/07 season and resulted in an increase to 3850 from the previous Summer 2006 Declared Capacity of 3250. The subsequent increase to 4050 came in Summer 2007 and was achieved through operational improvements to limit passenger dwell time and the related increase in the use of Self-Serve Kiosks (SSKs). In all cases, the constraining terminal element is the Departure Concourse.

25. When Pier D opened in Winter 2007/08, the Boarding Gate capacity increased. However, as the constraining terminal element was unaffected, the Declared Capacity did not change, remaining at the Summer 2007 level of 4050.

26. T1X no longer is designed to provide additional terminal processing capacity so does not affect capacity. It is primarily a retail facility as noted by Ryanair in point 13 of their Response dated 21 January 2009. While Ryanair seem to acknowledge that the original design for T1X which had the potential to increase the Declared Capacity was superseded by the current design, they inexplicably state that they "believe that even without T1X, which is almost exclusively retail (and storage) space, (T1) is capable of 4,800 passenger movements per hour." Thus the hourly throughput claimed by Ryanair is nothing more than assertion with no supporting information provided.

How does this busy-hour capacity convert into an annual throughput capacity?

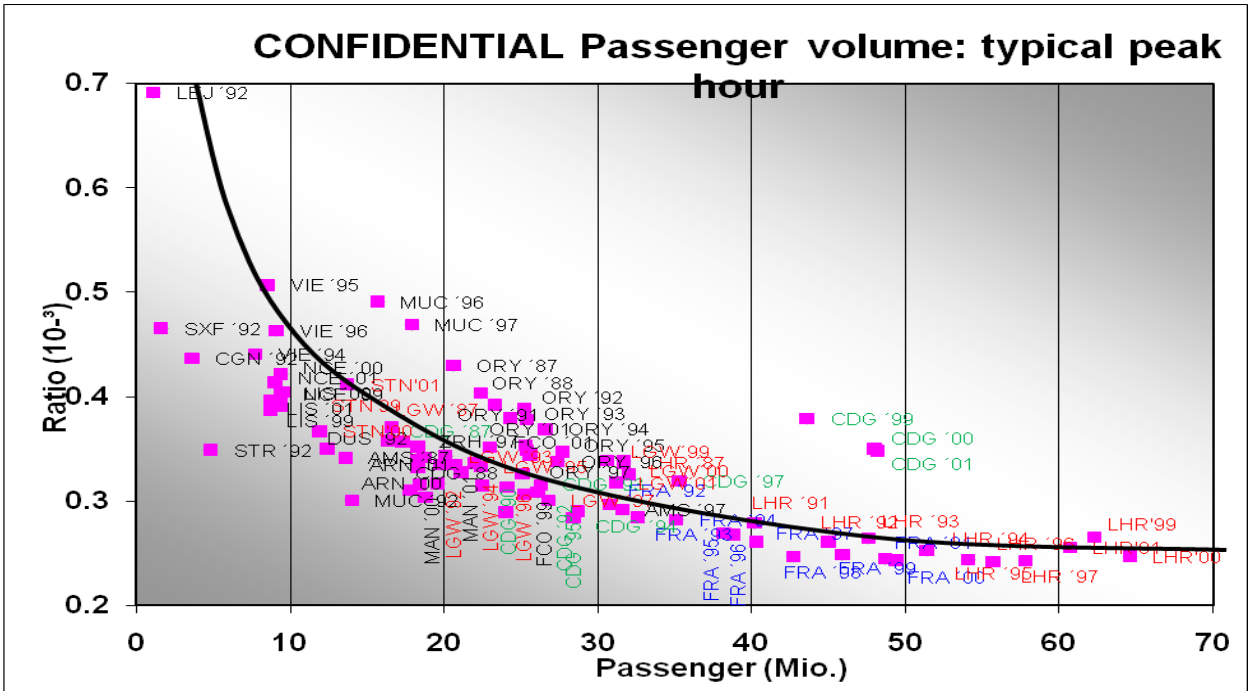
Relevant factors

27. CAR has asked DAA to explain how does the busy-hour capacity of the terminal converts into an annual throughput capacity. There is, however, no simple, or single, answer to this question. This is because the busy-hour capacity of an airport does not convert to a single annual capacity but rather a range of annual capacities depending on a number of factors, including the likely demand for aircraft slots in the less popular off-peak periods and the sizes of these aircraft, the load factors achievable and seasonal fluctuations that might occur.

28. For example, if an airport which is operating at capacity in the peak hour has 10 new daily flights added in the off-peak period, this could result in around 500,000 additional passengers passing through the airport annually though the peak hour throughput has not changed at all.

29. The type of airline operation at the airport must also be considered. For example, transatlantic operations lead to a peaky profile at certain times of the day, with troughs in between. Low Cost Carrier operations are frequently characterised by departures/arrivals throughout the day to short-haul destinations with short turnarounds. Hub operations which are designed around connecting traffic will have short-haul services feeding the long haul departures and exhibit peaks and troughs throughout the day depending on the levels of development of the hub system.

30. The level of congestion is also an important factor as, in congested airports, the off-peak periods tend to “fill up” so that the profile throughout the day becomes more consistent. However, in uncongested airports, or where additional tranches of capacity have been brought on-stream in a congested airport, the peak period shows higher growth than the off-peak. Growth in traffic is strongest in the most desirable i.e. peak periods, so the profile of operations varies through the day. This is consistent with the following chart provided to the Commission in December 2006 which illustrates that as airport congestion increases at an airport, the peak hour to annual ratio declines, and specifically that where additional capacity is added, the ratio is increased as growth rates during the peak hour increase more than the average (as seen in Paris CDG in 1999 to 2001).



31. Similar issues arise at weekly and seasonal levels, whereby some airports show significant variations in traffic levels within the week or by month/season.

32. Thus, very different annual values arising from various operating profiles can correspond to the same peak hour demand profile. There is no simple relationship between the busy-hour throughput and the annual throughput, and an expectation that such a relationship should or does exist indicates a lack of understanding of the nature of the operation of an airport. It is for this reason that DAA has consistently stated the Annual Throughput Capacity of Terminal 1 as a range rather than a single figure.

33. The most important point to bear in mind in determining this range is that it is the busy-hour capacity that is the constraining factor for airport throughput. "Annual capacity" is a term often used as a convenient abbreviation, but it would be more accurate to consider this not so much as a capacity than as "an equivalent annual throughput based on flight schedules and a passenger profile pattern which would result in a peak hour demand matching but not exceeding the busy-hour capacity".

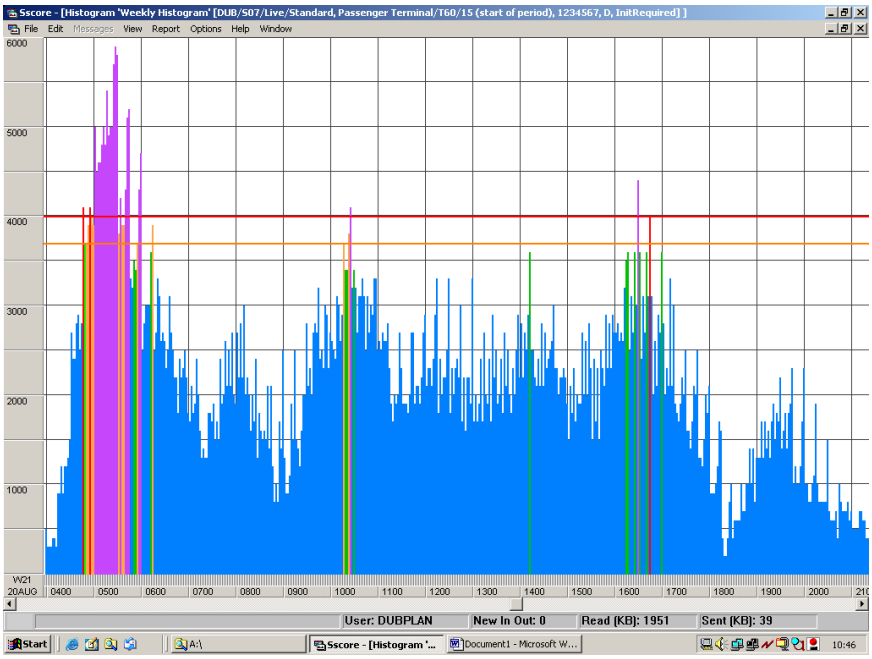
Calculating the Capacity of T1

34. Consistent with the principles set out above, the Annual Planning Capacity must be based on the Planning Busy Hour Capacity of 3650 (and not, contrary to what Ryanair suggests, on the Declared Capacity).

35. Considering this factor alone it is clear that the Annual Planning Capacity must be less than 90% (i.e. 3650/4050) of the throughput experienced when T1 was constrained with a peak hour Declared Capacity of 4050. The recorded throughput in 2007 was 23.3 million passengers, therefore, the Annual Planning Capacity must be lower than 90% of 23.3 million, that is 21 million. However, this throughput was achieved when the terminal was under **constrained** conditions and is not applicable as an **unconstrained** planning basis.

36. To understand the relevance of constrained versus unconstrained traffic at an airport, consider the condition at Dublin Airport in Summer 2007 when it began operating as a Level 3, Coordinated airport as a result of the high levels of capacity constraint. Under these conditions, airlines are not able to schedule all of their flights at the times they would ideally desire. As noted, the Declared Capacity was 4050 departing passengers. The 2007 annual throughput was approximately 23.3 million annual passengers. Without constraints, it is likely that the annual throughput would have been similar. However, the busy-hour departing passenger volume would have been much higher.

37. A clear indication of the historic level of demand in the peak hour if unconstrained by capacity is given in a letter from James Cole, Director of Coordination ACL, to the Dublin Airport Coordination Committee Executive which stated that unconstrained departures demand would be around 6000 passengers per hour for the Summer Season. This value was arrived at by ACL, independently of DAA, through discussions with the airlines operating at Dublin on what their preferred slots would be in the forthcoming summer season. This illustrates that the peak to annual coefficient at Dublin would differ dramatically (potentially 50%) for an unconstrained airport compared to a constrained airport.



Graph indicating ACL's analysis of required capacity to meet airlines desired schedules for Summer 07

38. Using the unconstrained departures peak hour demand as 6000 (as estimated independently by ACL), then the ratio of annual throughput (23.3m in 2007) to unconstrained departures peak hour demand would be 3883 (23.3m divided by 6000). If this is then applied as a coefficient to the departures peak hour planning capacity of 3650 to derive an equivalent annual throughput capacity for T1 it would be around 14.2mppa (3650 * 3883).

39. Instead of using 3883, DAA has used 5000 to 5500 as a more conservative estimate of this ratio to give a T1 planning capacity of around 18 to 20mppa[4]. This takes a more conservative view on the peakiness of demand compared to the 2007 indications, and therefore assumes a better utilisation of the facilities (i.e. spread of airlines throughout the day). Given that most of the charter and non-based airlines will remain in T1, and that most long-haul activity will be based in T2, that seems a reasonable assumption to make.

40. To predicate such a fundamental issue of the Airport Development programme as the size of the terminal on a simple ratio-based analysis is not a robust approach to terminal sizing. It can produce very different outputs if there are slight alterations made to the input parameters. This volatility when applying simple ratios to try to estimate a complex relationship is why expert analysts including Arup do not use this approach. When planning for future capacity at Dublin it is not appropriate, and in fact deeply flawed, to simply look at the historic throughput in the last couple of years and divide it by the Declared Capacity to arrive at a ratio for the future.

[4] DAA's estimates of capacity at 18-20 mppa was predicated on the delivery of processing capacity in T1X, so the actual current capacity would be at the lower end of this range. The BAA review of WHA work commissioned by DAA supported more restrictive estimates, suggesting a capacity of 15mppa before additional capacity increments were considered. (See BAA Review of WHA Terminal Capacity Assessments, April 2005, sent to the Commission as Appendix to the DAA Review of WHA Draft Assessment of Capacity at Dublin Airport in April 2005.)

III Comments on Ryanair's Calculation of T1 Capacity and its relationship to T2 sizing as outlined in its Response to CAR dated 21 January 2009

41. In point 18, Ryanair states "T1 would have a capacity of 4,800 departing passengers per hour (once the works to Area 14, Pier D and T1X were completed) which is equivalent to 26mppa." There are two numbers cited in this point and they are both fundamentally flawed. As explained in this paper, 4800 referred to a design for T1X which was not implemented and therefore the figure has no basis in fact. The Declared Capacity of T1, including the noted works, is 4050 and as explained in this paper, is higher than the Busy-Hour Capacity of 3650 which achieves the appropriate level of service in all parts of Terminal 1.

42. In points 19, 20 and 21, Ryanair lists many multipliers to convert the erroneous peak hour capacity into various annual capacities. However, all of the ratios are based on a constrained condition and do not represent the peaking characteristics expected (based on historically requested slots) once an unconstrained condition has been achieved at Dublin Airport. As noted in this paper, when planning for future capacity it is flawed to simply look at the historic throughput in the last couple of years and divide it by the Declared Capacity to arrive at a ratio for the future

43. Ryanair then compounds these errors by assuming that the capacity of Terminal 2 can be calculated by subtraction. As noted by DAA on numerous occasions, the sizing of Terminal 2 was based on a detailed and extensive bottom-up analysis of the peak hour requirements of the likely airlines assigned to that facility. Its sizing and capacity is fully compatible with the appropriate utilization of Terminal 1 in an unconstrained condition.

Appendix 1: Curriculum Vitae for Regine Weston, ARUP

Appendix 2: T1 - A Capacity Constrained Facility (2007)

11:00am Sunday 22nd July (Typical busy day)

Throughput through security recorded as 3512 pax per hour at 11:15

11:00am Sunday 22nd July (Typical busy day)

Throughput through security recorded as 3512 pax per hour at 11:15

16:20pm Sunday 22nd July (Typical busy day)

Throughput through security recorded as 3475 pax per hour at 16:00

16:20pm Sunday 22nd July (Typical busy day)

Throughput through security recorded as 3475 pax per hour at 16:00

Appendix 3: Declared Capacity at Terminal 1 over the last six seasons

Season	Departures				Arrivals		
	Declared Capacity	**Constraining Terminal Area**	**Changes since previous season**		**Declared Capacity**	**Constraining Terminal Area**	**Changes since previous season**
S2006	3250	Circulation & Security Screening	n/a		3000	Immigration	n/a
W2006/07	3850	Circulation	Area 14 open; Pier A Security Screening Expansion		3150	Immigration	Pier A Immigration Reconfiguration
S2007	4050	Circulation	Operational improvements; reduced pax dwell time related to increased use of SSKs		3550	Immigration	Operational improvement; increased use of Pier A for EU pax
W2007/08	4050	Circulation	Pier D included but no impact on Declared Capacity as Boarding Gate Capacity is not the Constraining Terminal Area		4380	Bag Claim	New Pier A/D immigration moves Constraining Terminal Area to Bag Claim
S2008	4050	Circulation	No Change		4380	Bag Claim	No Change
W2008/09	4050	Circulation	No Change		4380	Bag Claim	No Change

* Circulation refers to Departure Concourse Circulation in and around the check-in areas
** The separate declarations made for arrivals and departures reflect the fact that the peak departures demand occurs at a different time of the day to the peak arrivals demand. It also illustrates that different functional areas may experience different service levels in the same period.

Regine Weston

Aviation Consultant

Profession
Airport Planner

Current Position
Arup Aviation Consultant

Professional Experience
2003-Present Arup Aviation
Principal Consultant

2000-2003 Arup
Principal and Leader of Arup's Airport Planning Group

1985-2000 NAPA Airport Consultants
Increasing responsibilities culminating in President.

Qualifications
B.A.Sc (Hons.) Industrial Engineering

Professional Associations
Professional Engineers of Ontario

Consulting Engineers of Ontario

Publications
"Guidance for Estimating Occupancy in Airport Terminals", FAA (Publication Pending)

"Terminal Systems Analysis by Microcomputer Model", Airport Forum

"Developing a Space Program for Airport Passenger Terminals", FAA (Publication Pending)

"Passenger Flow Dynamics and Level of Service in Airport Terminal Buildings", FAA (Publication Pending)

"More passengers, more queues, more delays?", Ingenia

Lectures
"Airside and Landside Computer Models", Airport Systems, MIT, 1998-2006

"Terminal Planning and Design", FAA Annual Airport Conference, 2002

"Simulation Modeling in Airport Design and Development",
IATA Fundamentals of Airport Development

Key Data

Regine Weston is a registered Professional Consulting Engineer and an internationally recognized expert in Airport Planning and Systems Analysis.

Specializing in terminal and apron capacity/demand analyses and forecasting, Ms. Weston has been responsible for the development of computer models to facilitate this activity. The software has been utilized at major airports around the world including Doha, Abu Dhabi, Dublin, Heathrow, Manchester, La Guardia, Newark and John F. Kennedy in New York, Atlanta, Dulles and Reagan (National) in Washington, Toronto, Bangkok and Seoul among many others.

Ms. Weston is experienced at scenario assessment and is able to rapidly model and assess the impact on airports of alternative traffic assignment, forecast scheduling, development phasing options and physical planning scenarios

Relevant Projects

Abu Dhabi International Airport, UAE
Primary client contact for Arup standing services contract including strategic, analytical and physical planning options.

Spreadsheet Modelling, Gate Analysis, and Simulation of the existing Terminals 1, 2, and Terminal 3 to assess physical and operational alternatives to meet demand requirements up to the opening of the planned midfield terminal.

Assisting Airport Authority in demand generation and planning reviews of the new Midfield Terminal Complex.

New Doha International Airport, Qatar
Under Arup's standing service contract, providing strategic advice on terminal sizing, phasing and level of service.

New Lisbon Airport, Portugal
Generation of future planning day schedules and program of requirements through 2050.

JetBlue JFK Terminal Planning, USA
Detailed assessment of current operations to determine capacity and interim expansion options in T6.

Responsible for generating and evaluating alternatives for development of new Terminal 5 for JetBlue operations at their New York hub.

Dublin Airport, Ireland
Capacity Assessment of the existing Terminal 1 facility to establish peak hour scheduling limits.

Providing expert advice to the T2 team and their client, Dublin Airport Authority, regarding forecasting, airline assignment scenarios, terminal requirements, and project phasing.

Johannesburg (OR Tambo) International Airport, South Africa
Advising the design team on airline allocation between the existing facilities and new midfield terminal, including various phasing and investment options.

Azul Airlines, Brazil
Assessing the apron and terminal capacities at key airports for Azul, a new low-cost airline in Brazil. Strategic advice on scheduling, operational and facility issues provided directly to the airline CEO.

London-Heathrow Airport, UK
Provided future forecast demand analysis and Master Plan expansion concepts, including new runways, terminals and ancillary facilities, to the year 2030 – for London area airports, including Heathrow and a new site as part of the Southeast Regional Airports Study (SERAS).

Paris-Charles de Gaulle and London-Heathrow
"Star Alliance" Consolidation
Completed feasibility studies for the consolidation of the Star Alliance in Terminal 2A at Paris-CDG, and in London Heathrow's Terminal 1. The terminal redevelopment assessment included traffic analysis and schedule and programming, and the development of proposals to accommodate new traffic transfer patterns and facilitate hubbing.

ARUP

Atlanta International Airport, USA
Most recently analyzed 2008 gate requirements involving the consolidation of international flights in the new EIT facility.

Previously developed solutions which can be rapidly implemented to improve passenger level of service at the world's busiest airport.

Using future demand analysis, assisted in the Master Plan, review of current gate utilisation and the identification of options for improvement including aircraft gate and terminal processing simulations for the existing conditions and proposed alternatives to the year 2015.

NWA MSP 2020 Plan, USA
Responsible for forecasting, gate demand assessment, and airline assignment scenarios for an airport-wide plan to accommodate growth for NorthWest, its SkyTeam partners and all other users of Minneapolis St. Paul through to the year 2020 and beyond.

Federal Aviation Administration, USA
Developed a research paper on Passenger Flow Dynamics and Level of Service for the FAA's Volpe National Transportation Systems Center.

The relationship between peaking patterns, staffing, queuing & wait times was explored, with references to real-world examples illustrating the way in which these issues impact the passenger experience at airports.

JetBlue Boston Logan, USA
Responsible for apron and terminal planning for JetBlue's 11 gate facility at Boston Logan.

JetBlue Terminal Planning, USA
Working with JetBlue Opertations and Corporate Real Estate to review Airport Authority proposals at key stations such as Long Beach and Fort Lauderdale.

Toronto-Lester B. Pearson International Airport, **Canada**
Providing ongoing planning and demand analysis in the preparation and implementation of a 30 year, 140 gate, terminal development master plan to accommodate a forecast demand of 50 million annual passengers in one integrated terminal building. The project includes detailed traffic and operational analysis to ensure appropriate project staging and implementation.

Financial Assessment Analysis, Pickering Lands, Canada
Project Director responsible for determining the commercial viability of constructing a "second" Toronto airport. The project included the development of a programme of requirements for a future airport, physical plans, together with existing site assessment and full cost estimation.

LaGuardia International Airport New York, USA
Working on behalf of the PANYNJ, gate utilization analysis and proposals for optimization under a variety of operational and leasing scenarios.

John F. Kennedy International Airport, **USA**
Provided forecast demand analysis, gate modelling and terminal simulation services to assist in the development of planning alternatives and to test the robustness of selected options in the redevelopment of this major US airport.

Newark International Airport, USA
Provided future demand forecasts and analyses to the Port Authority of New York and New Jersey to validate strategic planning initiatives in the ongoing redevelopment of the broader airport terminal facilities and Continental's Global Gateway plan for Terminal C. Analysis includes impact of traffic forecasts on gate capacity and the examination of terminal layout alternatives to reduce potential passenger congestion while optimizing airline assignments and gating capacity.

Washington Dulles Tier 2 Planning and Programming, Washington, USA
Responsible for the provision of planning and space programming services including simulation for a new 44 gate midfield concourse to serve United Airlines' hub operations.

Washington Reagan (National) Airport, USA
Short and long-term planning and simulation for baggage and passenger security for compliance with TSA regulations.

Previous work included programming and passenger flow simulation including future demand forecasting to validate planning for the rehabilitation of historically significant passenger terminal (Terminal A).

Seattle Tacoma International Airport, USA
Analysis of physical and operational configurations to comply with TSA requirements for screening.

Groundside advice, passenger flow simulations and gating demand analysis to assist in the provision of an operational gate, terminal and groundside expansion plan. Determination of "ultimate capacity" for the various processing components.

Greater Orlando International Airport, USA
Provided future forecast demand analysis including passenger terminal and apron utilization demand and the development and analysis of hypothetical schedules to advise on issues related to the development of the South Terminal Project.

Miami International Airport, USA
Development of 4000 peak hour passenger schedules for various airline assignments, gate and passenger flow simulations to validate arrivals facilities program.

Manchester Airport, **UK**
Using future forecast demand and analysis of current capacity have assisted Manchester in making strategic long term development decisions maximizing existing capacity and efficiently planning future traffic assignments and terminal expansion options.

Regional Air Services Study, Edinburgh and Glasgow International Airports, Scotland
Identification of long-term land use and capacity solutions for Edinburgh and Glasgow airports based on 30-year traffic projections of 28 million annual passengers for the two airports. Solutions involve airport redevelopment and expansion alternatives, including additional runways to supplement peak hour capacity.

Paris-Charles de Gaulle Airport, **France**
Developed for Aeroports de Paris a detailed People Mover ridership forecasting model of Charles de Gaulle through the year 2030, including airline and sector assignment scenarios and future planning day schedules.

Ninoy Aquino International Airport, Phillipines
Provided forecast demand, traffic analysis and schedule development; terminal and gate requirements; and terminal flow simulations to validate planning options for new International terminal, Terminal 3, processing a projected 13 million annual passengers.

Ottawa Program Definition, Canada
Lead the airport planning team in the development of a 20-year terminal development plan including preparation of comprehensive Program Definition Document.

Calgary International Airport, Canada
Using future forecasts and passenger scheduling development, provided Calgary Airport Authority with airfield capacity analysis and confirmation of 10 year Capital Development Plan including traffic forecasts, programming, strategic expansion concepts, construction staging, and cost estimates.

Vancouver International Airport, **Canada**. Provided an analysis of capacity/demand for the current and planning years, and of proposed alternatives, using in-house computer models.

Aéroports de Montréal (AdM), Canada
Assisted AdM with a series of strategic decisions on expansion, rehabilitation and traffic allocation at and between Montreal's Dorval and Mirabel airports.

Winnipeg International Airport, Canada
Served as facilitators during Value Planning session to generate ideas for cost effective modifications to the WAA AIRPlan, to ensure financial viability. The session examined all aspects of the plan to identify potential savings, without adversely impacting the passenger experience.

Project Director for a comprehensive Program Definition Document which included the evaluation of up to twenty different expansion and new build options. Included forecasting, demand assessment, program of requirements, site plans, terminal layouts, cost estimation and financial analysis.

John C. Munro International Airport, Hamilton, Canada
Airport planner for the airport development plan. The study includes terminal area master planning for a 20-gate terminal. It involves a new passenger terminal building, related apron expansion and landside facilities to support the terminal complex.

Calgary International Airport, Potential Airline Realignment Impact Study, Canada. Conducted a confidential analysis of various airline merger scenarios in order to assist the CAA in determining potential effects on ongoing development planning. This included a review of forecasts and development of various future planning day schedules.

Calgary International Airport, Facility Utilization and Requirements Study, Canada. Analysis of existing terminal and gate utilization. Confirmation of 10 year Capital Development Plan including traffic forecasts, programming, expansion concepts, construction staging, and cost estimates.

Calgary International Airport, Airfield Capacity Analysis, Canada. Using future forecasts and passenger scheduling development, provided Calgary Airport Authority (CAA) with airfield capacity analysis and confirmation of 10 year Capital Development Plan including traffic forecasts, programming, strategic expansion concepts, construction staging, and cost estimates. Most recently have assisted the CAA in determining the potential impact of airline consolidation on those development plans.

Dorval and Mirabel International Airports, Canada. As part of the Montreal Airports Study, provided schedule development, future forecasting, runway capacity/demand analysis, and aircraft gating analysis for traffic consolidation at either of the two airports. A total of 21 Nominal Schedules were developed for Dorval and Mirabel International Airports, Montreal, with subsequent updates. In addition, provided gate capacity analysis of the airspace and apron conditions at Dorval International Airport, performed using the FAA's SIMMOD Airspace Simulation software including analysis of different traffic assignments and related gate impacts for future forecasting.

Bermuda International Airport, **Bermuda**
Provided terminal expansion review and analysis through the selection of planning day schedule and subsequent development of simulation model generating capacity/ demand analysis of the enplaning system.

New Bangkok International Airport, Thailand
Provided expert forecast and traffic analysis support including strategic airline assignments between existing airport and new airport to substantiate the Business and Financing Plan for the Second Bangkok International Airport.

Juanda International Airport, Indonesia
Provided future traffic forecasting analysis to substantiate financing assumptions for major airport improvements including private sector terminal area expansion and redevelopment proposal.

New Seoul Metropolitan Airport, **Korea**
Provided analysis of terminal and aircraft gate requirements, including future forecast demand and existing terminal and gating simulations using the in-house software to support design development.

Brisbane International Airport, **Australia** Provided a review of new terminal complex including schedule modifications, forecast demand analysis, aircraft gating, terminal flow, check-in desk allocation, and sensitivity testing.

Tribhuvan International Airport, **Nepal**
Provision of schedule analysis including traffic forecasting, maximized terminal flow, investigation of the effects of operational variables and validating terminal facility requirements and layouts.