Report On The Determination Of Maximum Levels of Airport Charges – Part 1

Report on the Reasons for the Determination

Commission Paper CP8/2001

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FOREWORD

I am pleased to present the first statutory report of the Commission. It accompanies a determination specifying the maximum levels of airport charges that may be levied by an airport authority.

The report follows a robust and transparent consultation process initiated and directed by the Commission. 32 interested parties made representations to the Commission. The representations were made to the Commission in both oral and written form. The oral representations were made at public hearings held by the Commission on the 17th and 18th July 2001. The written submissions were made to the Commission on or before 26 July 2001 and then posted by the Commission on its website.

I would like to thank each of the interested parties who made representations. The representations assisted the Commission greatly in discharging its statutory functions.

William Prasifka
Commissioner

26th August, 2001.

Report on the Reasons for The Determination

Statutory Objective

Under Section 33 of the Act, in making its determination, the Commission is obliged to "*aim to facilitate the development and operation of cost effective airports which meet the requirements of users*".

As the Commission stated in CP6/2001, in aiming to facilitate the development and operation of cost effective airports, the Commission must have due regard to each of the 10 specified factors contained in Section 33 of the Aviation Regulation Act, 2001, 'the Act'. However, the extent to which reliance on any one of the factors contributes to the achievement of the statutory objective is a matter for the Commission to determine.

The Commission received many representations from interested parties during the statutory consultation period concerning the stated degree of reliance on the ten statutory factors in the Commission's draft determination. Under the Act, the Commission has had due regard to each of the ten statutory factors specified in Section 33. However, the Commission was also free to consider any other issue, which would assist in the achievement of the statutory objective, and did so as part of its consideration of representations made to it pursuant to Section 32 of the Act. The reasons for accepting or rejecting representations are contained in CP9/2001.

Having accepted certain representations and undertaken further relevant work, the Commission proceeded to calculate the maximum levels of airport charges using a financial model, the assumptions of which are set out in Appendix I

Ministerial Direction

On 16 August 2001 the Minister exercised her power under Section 10 of the Act to give the Commission a direction (see Appendix II). The direction relates to the function of the Commission to set a maximum on airport charges. In setting the maxima, the Commission was directed to "make every reasonable effort to ensure that its final determination reflects the important emphasis which the Government has placed on balanced regional development." In particular, the Minister refers the Commission to (i) The National Development Plan 2000-2006 (NDP) and one of its four objectives of "fostering of balanced regional development, and (ii) National Spatial Strategy (NSS) and one of its key principles of "the creation of the right conditions for the balanced regional development to take place by developing the potential of areas in the regions to create and sustain economic strength in a structured way."

Following receipt of the direction, the Commission undertook an intensive review of the NDP and the NSS (see Appendix III – bibliography). In particular, the Commission had to determine how the objective of balanced regional development, as articulated in the NDP and NSS, could be integrated into the Commission's final determination. The final determination must still achieve the statutory objective while having due regard to the statutory factors (as set out in Section 33 of the Act).

A specific objective and strategy of the NDP is "fostering balanced Regional Development." Chapter 3 of the NDP addresses the issue of Regional Development and notes in general the development imbalances "between and within regions in the distribution of national economic progress." As a result of such imbalances, the NDP seeks to promote two types of policies simultaneously: (i) "address urban congestion and general bottlenecks to growth, particularly as regards economic and social infrastructure and human resources, and (ii) "further develop counter-balances to Dublin, relieving

pressure on the Capital and its hinterland, and distributing growth more widely throughout the Region." In its final determination, the Commission has attempted to promote both policies, to the extend that it furthers the statutory objective, by ensuring that Dublin has sufficient resources to relieve congestion and bottlenecks while also providing Shannon and Cork with the necessary resources to develop as counter-balances to Dublin. Preferring one policy at the expense of the other would be at variance with the NDP.

The NDP goes on to identify the particular means of fostering balanced regional development. It calls for the "focused development, as Regional Gateways, of a limited number of strategically-placed centres which are already displaying the potential (i) to achieve strong and sustainable economic growth driven essentially by the interplay of market forces, location and accessibility and (ii) to promote such growth within their zones of influence." Here, the Commission must have consideration in its final determination for the "focused" development of Regional Gateways. Such gateways are self-selecting by the interplay of market forces, location and accessibility. The Commission should not undermine the position of the Regional Gateway by facilitating the development of inefficient infrastructure which cannot be sustained in the medium to long term. Such a policy would undermine the natural attractiveness of the location which made it a Regional Gateway in the first place and be contrary to the NDP.

The direction of the Minister also refers the Commission to the Scope and Delivery document of the NSS. The Scope and Delivery document sets out what it sees as the elements relating to the spatial structure of Ireland emerging from the NDP. As is the case with the NDP, the NSS is not grounded in the preferment of one region over the other, but "envisages continued economic growth for the S+E and B, M+W regions in terms of achieving greater national competitiveness within both the EU and a global context." The NSS, as does the NDP, sees the need for greater infrastructure development in Dublin ("The role of Dublin in Europe – and its

infrastructure needs in this context.") and outside of Dublin ("The provision of infrastructure measures in terms of transportation and communication services to sustain and enhance rural development prospects").

Therefore, in complying with the direction of the Minister, the Commission must seek to integrate two objectives into its final determination. First, the need to provide Dublin with sufficient resources to provide for its continued infrastructural development. Second, the need to ensure that Shannon and Cork can develop strong and sustainable economic growth and therefore further develop as Regional Gateways.

The Commission believes that the first objective, consistent with the NDP and NSS, is best met by providing Dublin with a separate price determination. This preserves Dublin's particular place allocated to it by the NDP and NSS and provides it with sufficient resources for further development. It also ensures that development at Dublin will not be restricted by a cross subsidy to Shannon or Cork - a policy contrary to the NDP and NSS.

The Commission believes that the second objective is met both by the individual price determination on Dublin and the overall price determination on all three airports. This approach to regulation ensures that development at Shannon and Cork will be sustainable, in line with the interplay of market forces, location and accessibility. Furthermore, it also ensures that Shannon and Cork will have both adequate resources for development while providing the airport authority with the maximum flexibility possible as to the implementation of an appropriate development strategy.

Statutory Factors

1. *"the level of investment in airport facilities at an airport to which the determination relates, in line with safety requirements and commercial operations in order to meet current and prospective needs of those on whom the airport charges may be levied"*[1]

   The Commission received many representations from interested parties in relation to this statutory factor. Airlines expressed a view that this statutory factor must be considered in the context of the overall statutory objective. In particular, many airlines expressed a concern that the capital expenditure programme (CAPEX) of Aer Rianta did not and would not meet the needs of users. Following a careful analysis of the CAPEX at Dublin, Shannon and Cork, the Commission accepted many of these representations.

   The Commission retained Infrastructure Management Group (IMG) to complete an assessment of the CAPEX programme of Aer Rianta, as well as advising on what the Recoverable CAPEX Programme should be. In that regard, the Commission notes the following in relation to both previous, as well as current CAPEX, for the Aer Rianta airports:

   - poor consultation with users of the airport
   - lack of transparency in quality of information provided to users of the airport, particularly as to planned costs of proposed projects
   - construction (both past and planned) of facilities that are inefficient and/or do not meet the requirements of users of the airports in line with best international practice,
   - inadequate or non-existent cost-benefit-analysis or business cases undertaken to justify specific CAPEX projects,

[1] Section 33(a)

- internal inconsistencies in information supplied by Aer Rianta to the Commission on the CAPEX Programme.

Therefore, the Commission has not relied on the Aer Rianta CAPEX programme in making its determination on the maximum levels of airport charges, save to the extent that it identifies necessary compliance/safety projects.

In its draft determination, the Commission had prepared its best estimate of a CAPEX programme for Dublin, Shannon and Cork airports based on the information and the documentation it had gathered at that time, referred to in the draft determination as the Recoverable CAPEX Programme. Many users of the airport made representations that elements of the Recoverable CAPEX Programme did not meet the requirements of users. The Commission accepted some of these representations.

Therefore, the Commission has revised its Recoverable CAPEX Programme for the final determination. It retains all projects deemed by the Commission to be necessary for safety or compliance. In addition, it also includes those projects required to increase needed capacity at the airports, but only those in line with the interests of users. The Commission will consider using its statutory powers which entitle it to obtain information from the airport operator to require the production of documents used to consult on and justify CAPEX. Details of the revised Recoverable CAPEX Programme are set out in Appendix IV.

Finally, the Commission has identified a need for additional facilities at Dublin airport to relieve congestion at Piers A and B (See Appendix V). The Commission, by way of maximum levels of airport charges, has provided Aer Rianta with adequate resources to construct such

facilities in the short to medium term. The Commission will carefully monitor the Aer Rianta CAPEX programme during the period of the Determination to determine if Aer Rianta is providing additional capacity that meets the requirements of the users of the airport.

2. *"a reasonable rate of return on capital employed in the investment, in the context of the sustainable and profitable operation of the airport"*[2]

The Commission continues to hold the view that providing a reasonable rate of return to the airport operator on capital employed appropriately rewards the regulated firm for its investments, thereby supporting the company's ability to meet the future requirements of users. Having proper regard to this factor facilitates the development and operation of cost effective airports that meet the requirements of users and assists in the achievement of the statutory objective. In doing so, the Commission has decided to set the return on capital equal to, and not in excess of, the cost of capital.

The Commission has defined the regulatory asset base and, on the basis of historic indexed cost, has valued that regulatory asset base at £457.3m. The Commission has sought and obtained expert advice on the assessment of the rate of return allowable to Aer Rianta. Appendix VI prepared by Dr. Colm Kearney, Professor of Finance at Dublin City University, was adopted by the Commission to determine Aer Rianta's reasonable rate of return (on a real, after-tax basis) for the period of the determination at 6%.

[2] Section 33(b)

3. *"the efficient and effective use of all resources by the airport authority"*[3]

The Commission continues to hold the view that having due regard to, and reliance upon this factor, promotes the achievement of the statutory objective. The representations made have assisted the Commission in refining its views on the efficiency and effective use of all resources by the airport authority. These are discussed more fully in connection with statutory factors 1 (investment) and 8 (international cost competitiveness).

In addition, the Commission now proposes to provide for an explicit "X" factor in its final determination in order to express its reliance on this factor in a more transparent manner.

4. "the contribution of the airport to the region in which it is located"[4]

The Commission received many representations on this statutory factor. In addition, on 16 August 2001 the Minister for Public Enterprise gave the Commission a direction under Section 10 of the Act, the text of which is attached as Appendix II.

Many of the representations asked the Commission, either explicitly or implicitly, to require that users of Dublin airport pay for the cost of Shannon and/or Cork airports. These representations have been rejected as they are fundamentally contrary to the Commission's statutory objective of facilitating the development and operation of cost effective airports, which meet the requirements of users. Such a cross subsidy cannot be in the interest of users of Dublin airport and would not be consistent with the development of cost-effective airports

[3] Section 33(c)
[4] Section 33 (d)

which meet the requirements of users. Accordingly, the Commission continues to hold the view that any reliance on Section 33(d) that would have the effect of requiring subsidies would only serve to frustrate the achievement of the statutory objective.

However, following consideration of the direction of the Minister, the Commission has determined that it is not necessary to provide for three separate price determinations in order to prevent Aer Rianta from engaging in likely inefficient cross subsidies. The same incentive effects can be achieved with one price determination covering all three airports and a separate determination for Dublin alone. As this latter form of price determination provides the airport operator with greater flexibility to fund developments at Shannon or Cork airport than the form provided for in the draft determination, it has been adopted by the Commission.

5. *"the level of income of the airport authority from airport charges at the airport and other revenue earned by the authority at the regulated airports or elsewhere"*[5]

In respect of this factor, the Commission received divergent representations from interested parties. The scope of the regulatory till recommended, depended largely on whether or not the interested party was an airport user or an airport operator. Airport users, generally, recommended a regulatory till as large as possible. The airport operator recommended a regulatory till limited to revenue derived solely from airport charges. Both positions are supported by economic argument.

The Commission continues to hold the view that there is nothing particularly remarkable about pricing certain aspects of the charges for airport services according to a dual income stream as such behaviour

[5] Section 33(e)

is found in competitive markets. In addition, the Commission continues to hold the view that there may be potentially adverse incentive effects of a regulatory till including commercial revenue on operations at airports approaching the limits of physical capacity.

Therefore, as before, the Commission has included commercial revenue in the regulatory till in all three airports. The Commission did consider excluding from the regulatory till in Dublin all revenue from commercial investments which took place after the Determination. However, Dublin, although a large airport, has ample room for expansion of capacity. In addition, the implementation of a dual till arrangement requires detailed cost allocation information from the airport operator. Such detailed information was not available from the airport operator. Therefore, the Commission has decided to proceed with a single till in Dublin for the period of this Determination.

Aer Rianta also earns income from international investments and other international activities (Aer Rianta International) and its group of hotels (Great Southern Hotels). The Commission received many representations calling for the inclusion of revenues from such activities into the regulatory till. The Commission has rejected all such representations since these activities do not have a sufficient nexus to the regulated activities. However, in defining the regulatory till, the Commission has also endeavoured to exclude all costs, direct and indirect, associated with these activities.

6. *"the operating and other costs incurred by the airport authority at the airport"*[6]

The final Determination of the Commission sets a maximum level of airport charges so as to cover all necessary operating and capital costs of the airport authority. During the period of the Determination, the Commission will closely monitor the revenue derived by the airport authority from airport charges, along with the operating and other costs incurred by the airport authority, to ensure that the maximum yields are not exceeded by Aer Rianta.

7. *"the level and quality of services offered at the airport by the airport authority and the reasonable interests of the users of these services"*[7]

In its draft determination, the Commission noted that it is considering the feasibility of formulating a sub-cap on particular services/facilities at Dublin Airport. Such a subcap would reflect the availability of lower cost/ lower quality services at Dublin. Certain interested parties recommended a subcap at Dublin (and at Shannon and/or Cork) for low cost access. The Commission has rejected these representations. The problem that is presented by such a subcap is that currently, at Dublin, use of such facilities that would be subject to the subcap, such as Pier A, are reaching the limits of available capacity. Facilities outside the subcap, such as Pier C, have significant excess capacity. Therefore, any relative price discount afforded to Pier A will create perverse incentives to the efficient use of all existing facilities at Dublin airport and will result in further congestion, at least in the short term. In addition, such a discount may create a disincentive for the airport operator to take the necessary action to alleviate the growing congestion in Piers A and B.

[6] Section 33(f)
[7] Section 33(g)

Therefore, the Commission has chosen to have due regard for the level and quality of airport services by providing the airport authority with sufficient resources to meet the requirements of airport users for additional capacity at Dublin.

In addition, the Commission has decided to measure quality and service standards so as to obviate the risk that price cap regulation may lead to a deterioration in both.

8. *"the cost competitiveness and operational efficiency of airport services at the airport with respect to international practice"*[8]

The Commission received a large number of representations on this statutory factor. The representations diverged widely. Some interested parties sought to have airport charges reduced by an amount directly in proportion to potential operational inefficiencies, identified as the result of a single benchmarked indicator. Others stated that all benchmarking understated, to a significant degree, improvements possible in operational efficiency since external factors, such as growth in traffic or improvements in technology, made improvements in efficiency inevitable and needed to be taken into account in the setting of efficiency targets. The airport operator held the view that benchmarking was suspect as a device for setting charges.

The Commission retained expert advice on the issue of international cost competitiveness and operational efficiency from IMG and this advice is fully set out in Appendix VII. The Commission continues to hold the view as stated in its draft Determination that benchmarking must be approached with considerable caution, particularly in relation

[8] Section 33(h)

to: the identification of comparator airports; the need to use objective metrics; and, in the interpretation of results. However, as is evidenced by the IMG report, the broad consistency of the findings across a range of indicators supports the findings made in the draft Determination that significant operational efficiencies are achievable at Dublin and Shannon airports. In addition, an analysis of operational performances of Aer Rianta, both past and future, is also consistent with the findings of the draft determination.

For Dublin Airport, the yield has been calculated taking account of OPEX efficiencies of 3.5% per annum. Cork Airport appears to be operating efficiently by comparison with its peer group. At Shannon Airport, the yield has been calculated taking account of OPEX efficiencies of 4% per annum.

Finally, for purposes of transparency, the operational efficiencies achievable have been included (along with other factors such as traffic growth and the size of the CAPEX) into an X factor to go into the regulatory price determinations. This includes an X factor for the single determination covering all three airports as well as an X factor for the sub-cap covering Dublin airport only.

9. *"imposing the minimum restrictions on the airport authority consistent with the functions of the Commission"*[9]

Under Section 32(6) the Determination may "*operate to restrict increases in any such charges, or to require reductions in them, whether by reference to any formula or otherwise".* By proposing a revenue cap based on a per passenger yield, with one other sub-cap in respect of Dublin airport, and a cargo sub-cap, the Commission will be affording a large measure of discretion to Aer Rianta.

[9] Section 33(i)

The Commission has decided not to proceed with a work load unit measure of revenue and has adopted a per passenger revenue measure, because this is closer to standard regulatory practice in other jurisdictions, and at the same time it is possible to be operated having regard to the significant cargo utilisation of the regulated airports. In respect of cargo, the Commission has decided to impose a sub-cap because a per passenger yield alone could result in the airport operator being inclined to discourage cargo business.

In relation to the runways, the Commission has decided that the case for a runway sub-cap for off-peak utilisation of runway 10/28 is compelling. This is because of the need to optimise the utilisation of this runway and the need to encourage efficient decision-making in terms of the timing of construction of an additional runway. The methodology used to calculate the off-peak cap is set out in Appendix VIII, a report which has been adopted by the Commission.

Subject to all of the above, Aer Rianta will be free to adopt a completely new charging structure, subject to applicable legal obligations, which include both Irish and European competition law. Accordingly, the Commission has sought to minimise restrictions on Aer Rianta, consistent with its own functions and Aer Rianta's discharge of its statutory functions. The Commission views this minimisation as being entirely consistent with the furtherance of the statutory objective, since the concern to minimise restrictions on the airport operator is designed to ensure that the efficiency gains from each regulatory intervention outweigh the cost of that intervention.

10. *"such national and international obligations as are relevant to its functions"*[10]

The Commission notes that it is only obliged to have due regard to national and international obligations, as are relevant to the functions of the Commission. To the extent that Aer Rianta has safety or compliance obligations under national law, including the Air Navigation and Transport Acts, 1936 to 1998, as well as legislation constituting, and relating to the Irish Aviation Authority, the Commission has had due regard to them in formulating its proposed Determination. They are incorporated into the Recoverable CAPEX Programme as compliance items.

Separately, given that airports are used both to enter and exit the State, they are subject to particular security, immigration, and health and safety requirements, collective referred to as compliance obligations. The Commission considers these to be national obligations. Those requirements are evolving and could be subject to change during the period of the Determination. At this point in time, the Commission has not been put on notice of any change in circumstances in the next 5 years, which would materially affect its treatment of compliance obligations in the financial model. Changes in compliance obligations, which are required over the next 5 years, the effects of which are quantifiable have been specifically allowed in the Recoverable CAPEX Programme.

In relation to cost pass throughs for security, the Commission has decided that their inclusion would be fundamentally at variance with the statutory objective of cost-effecive airports. Separately, the Commission also notes that Aer Rianta is planning to reorganise its use of human resources in the discharge of compliance obligation in

[10] Section 33(j)

respect of fire and security. This is likely to lead to cost savings. Finally, the Commission also notes that if after 2 years there was a material change in respect of compliance obligations, this could constitute substantial grounds leading to a review of the Determination.

In relation to international obligations, Ireland is a signatory to the Chicago Convention, which has been incorporated into domestic law by the Air Navigation and Transport Act, 1964. To the extent that this Treaty creates international and national obligations, the Commission has had due regard to it. In particular, it has considered ICAO document 9082/G in relation to the operation of a single till.

Separately, Ireland as a Member of the EU, is bound by its laws, and in particular the competition rules. Accordingly, Articles 10, 12, 81, 82, 86 and 87 of the Treaty may be generally relevant[11]. However, only Article 86 is a directly relevant international obligation. In that regard, the Commission is only proposing maximum permissible per-passenger yields, together with associated sub-caps, which will leave Aer Rianta free to convert those maximum permissible yields into a corresponding price structure for charges. In doing so, Aer Rianta will be bound by Articles 81 and 82 in particular.

The Commission has inserted a specific charge maximum in respect of cargo, and this is based on the cargo handling fee, which Aer Rianta notified for approval under the Groundhandling Regulations[12].

[11] Under the European Communities Acts, these obligations are also part of the domestic law of the state.

12 The inclusion of this fee within the determination does not amount to approval of this fee under the Groundhandling Regulations (SI 505 of 1998). The Commission has incorporated this figure since in proposing it, Aer Rianta will be assumed to have acted in accordance with the requirements of the Groundhandling Regulations, which require that fees for access to airport installations be relevant, objective, transparent and non-discriminatory. Those requirements approximate with the requirements of Section 33 of the Act.SI505 of 1998.

CP8/2001 - Appendices

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Appendix II –	Ministerial Direction under Section 10 of the Aviation Regulation Act, 2001
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APPENDIX I TO CP8

The Assumption Underlying The Commission's Financial Model of Aer Rianta

The Assumption Underlying The Commission's Financial Model of Aer Rianta

The Commission has obtained from its consultants, the Infrastructure Management Group (IMG) Inc., a Financial Model, which has been constructed to calculate the two maximum average per-passenger yields.

How the Model Works

This explanation of the Financial Model follows the format of the calculation of the Maximum Yield per Passenger which is illustrated below.

9. Table 1: ART Yield Calculation 2001/02:

		IEP £
1	RAB	457,294,032
	Multiplied by	
2	WACC	6%
	= Return on Capital	27,437,642
3	Plus: Depreciation	35,320,757
4	Opex*	209,714,472
	= Sub-total	272,472,871
5	Plus: Taxation	8,098,638
6	Minus: Gross Commercial Revenue	(182,481,110)
	=Maximum Allowable Revenue	98,090,398
7	/ Passengers	18,557,881
	= Maximum Allowable Revenue Yield per Passenger	**IEP £5.29**
		EUR 6.71

* Opex figure incorporates the effect of an efficiency improvement of 3.5% in Dublin Airport and 4% in Shannon Airport.

10. Table 2: Dublin Yield Calculation 2001/02:

		IEP£
1	RAB	326,719,185
	Multiplied by	
2	WACC	6%
	= Return on Capital	19,603,151
3	Plus: Depreciation	25,621,393
4	Opex*	133,804,952
	= Sub-total	179,029,496
5	Plus: Taxation	5,970,858
6	Minus: Gross Commercial Revenue	(121,727,378)
	=Maximum Allowable Revenue	63,272,976
7	/ Passengers	14,352,278
	= Maximum Allowable Revenue Yield per Passenger	**IEP £4.41**
		EUR 5.60

* Opex figure incorporates the effect of an efficiency improvement of 3.5%

The Regulatory Asset Base (RAB)

The RAB is based on the Indexed Historical Cost of the Net Fixed Assets as at December 31st 2000 for each airport as per Aer Rianta's figures[13]. The value of the imprudent investment at Pier C and the Shannon Terminal Building are deducted from the RAB. The RAB is adjusted each year for Inflation, for any new Capital Expenditure (CAPEX) and for the Indexed Cumulative Depreciation.

The Weighted Average Cost of Capital (WACC)

The WACC for Aer Rianta has been estimated for the Commission on a real, after-tax basis at 6% and on a before-tax value at 7%. In calculating the revenues allowed to Aer Rianta the Commission has estimated Aer Rianta's tax liability and included it directly in the Model, therefore, the after-tax rate of 6% is used in the Model.

Depreciation

The depreciation is calculated on the Historical Cost Valuation of the Existing Assets. New assets are added as per the CAPEX program and depreciated as per the detailed assumptions given in paragraph 9 below. The following are calculated for each airport's assets;

a) Cumulative Historic Cost Fixed Assets undepreciated
b) Depreciation charge for the Regulatory year
c) Cumulative Depreciation
d) Net Book Value Historical Cost Fixed Assets

Operational Expenditure (OPEX)

The OPEX has been calculated as follows:

a) The Aer Rianta General Ledger for the first six months of 2001 for each airport was divided into the following categories:
   Personnel
   External & Professional Services
   Energy
   Maintenance Supplies
   Insurance
   Other Expenses

[13] Statutory Submission dated 26th July 2001 – Appendix 4

Airport Retail Costs
Bank Charges and Business Rates (does not include any interest or finance charges)

b) The corporate (headquarter) costs were then allocated across the airports – see the detailed assumption in paragraph 9 below.

c) The Operational Expenditure was then divided by the number of passengers for each airport in the first six months of 2001.

d) The OPEX was then projected forward through the regulatory period using the traffic forecasts.

e) An estimate of regulatory fees was included in the Opex for each year.

Taxation

The Commission has modelled the future tax liabilities of Aer Rianta directly as per the detailed assumptions given in paragraph 9.

Gross Commercial Revenues

The Gross Commercial Revenues extracted from the Aer Rianta General Ledger, for the first six months of 2001, were divided by the number of passengers for each airport. The Commercial Revenues were then projected forward through the Regulatory period at the same per passenger rate plus inflation using the traffic forecast.

Passenger Numbers

The traffic forecasts as per the Aer Rianta's Centerline forecast is then used to divide the "Maximum Allowable Revenue" to provide the Maximum Yield.

TABLE 2: AER RIANTA'S CENTERLINE PASSSENGER FORECASTS ('000) BY AIRPORT

	DUBLIN	SHANNON	CORK	TOTAL
2001	15,192	2,559	1,709	19,460
2002	16,070	2,659	1,807	20,536
2003	16,931	2,752	1,901	21,584
2004	17,863	2,871	2,012	22,746
2005	18,838	2,992	2,122	23,952
2006	19,720	3,099	2,223	25,042

Source: Aer Rianta

Assumptions

The following assumptions have been made in the construction of the Financial Model:

i) The inter-company loans to the Great Southern Hotels and Aer Rianta International, totalling IEP£86,619,000[14] have been removed from both sides of the Balance Sheet of the airports. This is consistent with the Regulatory Till excluding these activities.

ii) The Depreciation in the model has been calculated as follows;
   a. Existing Assets to be depreciated over 15 years
   b. 90% of New Assets to be depreciated over 20 years
   c. 10% of New Assets to be depreciated over 5 years

iii) The Corporation Tax Rates used in the model are as follows;
   a. Financial year ended 31st December 2001 20%
   b. Financial year ended 31st December 2002 16%
   c. Financial year ended 31st December 2003 & onwards –12½%

iv) The Commission estimated the Capital Allowances of the Historical Assets and adjusted for changes in the Asset base during the Regulatory Period. The Capital Allowances were calculated in line with the rates which Aer Rianta have used in

[14] Aer Rianta Annual Report and Accounts 2000, Financial Assets Page 52

their Corporation Tax Return for the year ended 31st December 1999 and 2000.

v) The Income and Expenditure along with the Assets associated with Head Office have been allocated across the three airports on a per-passenger basis. There is not a great deal of empirical evidence of how Head Office overhead costs change as a group of airports increase output. However, in one study known to the Commission, where a regression analysis of the BAA Head Office overhead costs was carried out, it was found that a linear relationship existed between output and overhead costs, i.e. that there are no economies of scope or scale in respect of Head Office costs[15].

vi) Year 1 of the Regulatory Period will be from 24th September 2001 to 23rd September 2002 and likewise thereafter. For accounting purposes an assumption has been made that an accrual of six days income and expenditure for the start of the period of regulation equals that of the end of the period of regulation. This assumption has been made because the Financial Model has been prepared on an end of month basis.

vii) The inflation assumptions for the Model are as follows;
   a. The Commission has estimated that inflation for the nine months January 2001 to September 2001 will be 4.5%.
   b. An inflation rate of 3% per annum has been applied for the remainder of the regulatory period.

viii) The Regulatory Asset Base has been indexed in line with the assumed inflation rates.

ix) The Aer Rianta Centreline Traffic forecast, used in the model, has been adjusted from calendar years to the regulatory years i.e. from 24th September to 23rd September the following year, assuming as above that six days traffic at the beginning of the regulatory period is equal to six days traffic at the end of the regulation period.

x) Operational Expenditure increases in line with traffic forecasts.

xi) Gross Commercial Revenues increase in line with traffic forecasts.

xii) The Model's base currency is in Irish Pounds. This will be converted into Euros in January 2002.

[15] David Starkie & David Thompson – Privatising London's Airports – Institute for Fiscal Studies Report No 16

The yields also depend on the following assumptions:

- The Model assumes that there will be a dividend payout rate to the shareholder of 50% of the profits of the company each year.

- The model assumes a minimum cash balance of IEP£10 million.

- Surplus cash earned above this minimum is reinvested in Capital Expenditure.

- Surplus cash earned at one airport may be loaned to another airport for Capital Expenditure at an interest rate of 3.5% per annum.

- The actual operational expenditure for the period January 2001 to June 2001 and an estimate of the expenditure from July to September 2001 was used to construct the balance sheet as at 24th September 2001.

- In the construction of the company Balance Sheet the following assumptions have been made;

    a. Thirty days credit is given and taken on Creditors and Debtors
    b. In the absence of any reliable method of calculation the Accruals, Deferred Income and Other Creditors on the Aer Rianta Company Balance Sheet have not been adjusted.
    c. The target gearing is 50%
    d. The minimum Debt Service Coverage Ratio is 1.25

APPENDIX II TO CP8

Ministerial Direction under Section 10 of the Aviation Regulation Act, 2001

Oifig an Aire Fiontar Poiblí, 44 Sráid Chill Dara, Baile Átha Cliath 2.
Office of the Minister for Public Enterprise, 44 Kildare Street, Dublin 2.
Tel. (01) 670 7444 Lo Call (1890) 443311 Fax: (01) 604 1183 http://www.dpe.ie

16 August 2001

Mr William Prasifka
Commission for Aviation Regulation
36 Upper Mount Street
Dublin 2.

Dear Commissioner

I refer to section 10 of the Aviation Regulation Act 2001 which provides that "the Minister may give such general policy directions (including directions in respect of the contribution of airports to the regions in which they are located) to the Commission as he or she considers appropriate to be followed by the Commission in the exercise of its functions"

As I, and indeed the Oireachtas in general, regarded the issue of the contribution of the airports to their regions, as being of particular importance, a separate obligation in respect of this matter was inserted in the list of regulatory objectives in section 33, to which the Commission was required to have regard.

I wish to advise you that I have decided that it is appropriate at this juncture to issue a direction under section 10, so that as you reflect on your conclusions on the proposed price cap determination, you are aware of the purpose and intent of Government regional development policy. In that context I would like to draw your attention to the following:-

1. The National Development Plan 2000-2006 (NDP)

The NDP was as you are aware, framed after extensive consultation with social partners and regional interests. It represents a development strategy supported by a multi-annual investment commitment for all sectors. The Plan provides the foundation for Ireland's economic and social progress not just for the duration of the Plan but for the foreseeable future.

The "fostering of balanced regional development" is one of the four national objectives identified in the Plan. Specifically, the Plan states that it is the Government's objective to achieve more balanced regional development in order to reduce the disparities between and within regions and to develop the potential of the regions to "contribute to the greatest possible extent to the continuing prosperity of the country." The Government considers that our airports have a key role to play in supporting the national objectives of the Plan.

2. National Spatial Strategy

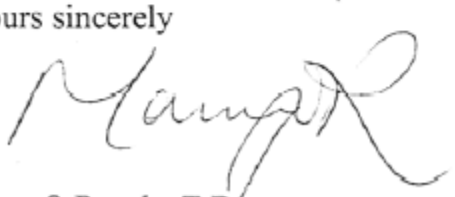
In order to bring together the various elements of regional policy and to achieve the necessary balance in accordance with the principles of economic competitiveness and sustainable development, the Minister for the Environment was mandated to prepare a National Spatial Strategy (NSS) which would translate the broad approach to regional development into a more detailed blueprint for spatial development.

One of the key principles to be achieved under the Strategy is the creation of the right conditions for balanced regional development to take place by developing the potential of areas in the regions to create and sustain economic strength in a structured way. In that regard you are referred to the "Scope and Delivery" document which is available on the Department of the Environment's website.

In the light of these Government strategies, I am directing that the Commission make every reasonable effort to ensure that its final determination reflects the important emphasis which the Government has placed on balanced regional development.

With best wishes

Yours sincerely



Mary O Rourke T.D
Minister for Public Enterprise

APPENDIX III TO CP8

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- CSF Evaluation Unit, EX Ante Evaluation of the National Development Plan 2000-2006 (Nov, 1999)

  The following papers were presented at The Regional Studies Association conference, "Building the Framework for Development: National Spatial Strategy" in Tullamore, 3rd April, 2000:

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APPENDIX IV TO CP8

IMG Recoverable CAPEX Programme

Capital Investment Program

Commission for Aviation Regulation

Infrastructure
Management Group, Inc.

August 25, 2001

Overview

1. Introduction and Executive Summary
2. Objective
3. CAPEX Drivers
4. Air Rianta Proposed CAPEX
5. Comments on ART CAPEX
6. Recoverable CAPEX
7. Stranded Assets
8. Assumptions, inputs and references

1. Introduction and Executive Summary

This report consists of IMG's initial review and recommendations regarding ART past and proposed CAPEX Program.

- CAR has requested that IMG provide a review of ART recent and future (next 10 years) CAPEX programme.
- IMG has used information provided by ART to justify the past and proposed CAPEX programs, as well as industry standards to review ART CAPEX.
- IMG has developed, based on industry standards and ART centerline air traffic forecasts, a proposed recoverable CAPEX program
- IMG has developed its own demand/capacity analysis to verify ART CAPEX and in the development of the recoverable CAPEX
- Items identified in ART CAPEX program as related to safety and compliance have been accepted without modification in IMG CAPEX
- Items identified in ART as capacity driven have been scrutinized using industry standards and IMG own Capacity Study.
- For passenger terminal buildings ART uses as its standard IATA level of service B. IMG has accepted this LOS.
- All CAPEX airfield investments have been determined using ICAO, the airport Master Plans and other studies and information collected.

1. Introduction and Executive Summary (cont.)

- Commercial and corporate projects identified as such in ART CAPEX have been scrutinized in the same way as other proposed projects
- Costs of proposed maintenance projects have been verified and maintained if adequately documented .
- Timing of all projects has been reviewed against ART proposed schedule and IMG's capacity analysis.
- From IMG Capacity Study stranded assets have been identified. IMG definition of stranded assets are those assets that were built before their time or in excess of the required cost or size.
- IMG CAPEX estimates have been grouped under the following categories for all three airports:
  - Safety and compliance
  - Capacity
  - Service
  - Commercial
  - Repair and maintenance
  - Other
- Items for which ART did not provide adequate justification or that based on IMG capacity study exceed the expected demand requirements have been disallowed.

1. Introduction and Executive Summary (cont.)

- IMG has identified based on its capacity analysis the following stranded assets:
  - Expansion of Shannon's passenger terminal building is 21.2% larger than was required
  - Construction costs for Pier C at Dublin exceeds by 22.7% average construction cost for similar projects at Dublin Airport and average construction costs of similar projects in the Dublin area
  - Number of aircraft stands at Dublin exceed the projected demand. Poor management of stands has produced an unjustifiable number of required stands. The estimated cost of those stands was £5.1 million.

2. Objective

Main purpose of the review of ART CAPEX was to satisfy the Commission mandate that "the level of investment in airport facilities at an airport to which the determination relates, [be] in line with safety requirements and commercial operations in order to meet current and prospective needs of those on whom the airport charges may be levied"

3. CAPEX Drivers

Capital investments at airports are generally driven by six main factors

- To Satisfy Safety and Compliance Requirements
- To Meet Capacity Demand
- For Operational and/or Maintenance Needs
- To Increase Quality of Services
- For Commercial and/or Marketing Purposes
- Other Needs (*Land Acquisition, Corporate*)

3. CAPEX Drivers

Safety and compliance requirements are:

- Set by national authorities such as: Irish Aviation Authority, Department of Public Enterprise, Department of Justice, Revenue Commissioners, Department of Health, Department of Agriculture, Department of Foreign Affairs, etc...
- Set by International and External Agencies: International Civil Aviation Organization (ICAO), International Air Transport Association, US Federal Aviation Administration (at Airports where US Carriers fly), etc…

Safety related CAPEX items were determined :

- Based on ART CAPEX
- Compared with industry common practices
- Costs from Irish construction industry and ART CAPEX both historic and future

3. CAPEX Drivers

Capacity is set:

- Based on air traffic forecasts and its composition
- For passenger terminal buildings using IATA's level of service (LOS). ART uses LOS B. IMG has adopted the same LOS
- For airfield facilities through the use of ICAO recommendations considering the type of traffic expected at the airport
- For other facilities through the use of industry standards and/or previous studies

Capacity CAPEX items were determined :

- Based on ART Centerline forecast models
- Based Demand/Capacity study
- Based on ART CAPEX list of capacity induced projects
- Based on demand requirements
- Based on industry common practices
- Costs from Irish construction industry and ART CAPEX both historic and future

3. CAPEX Drivers

Operational and Maintenance issues determined :

- Based on ART CAPEX
- Based on industry common practices
- Costs from ART CAPEX both historic and future

Service issues determined :

- Based on ART CAPEX
- Based on industry common practices
- Costs from ART CAPEX both historic and future
- Demand for specific type of service by users

3. CAPEX Drivers

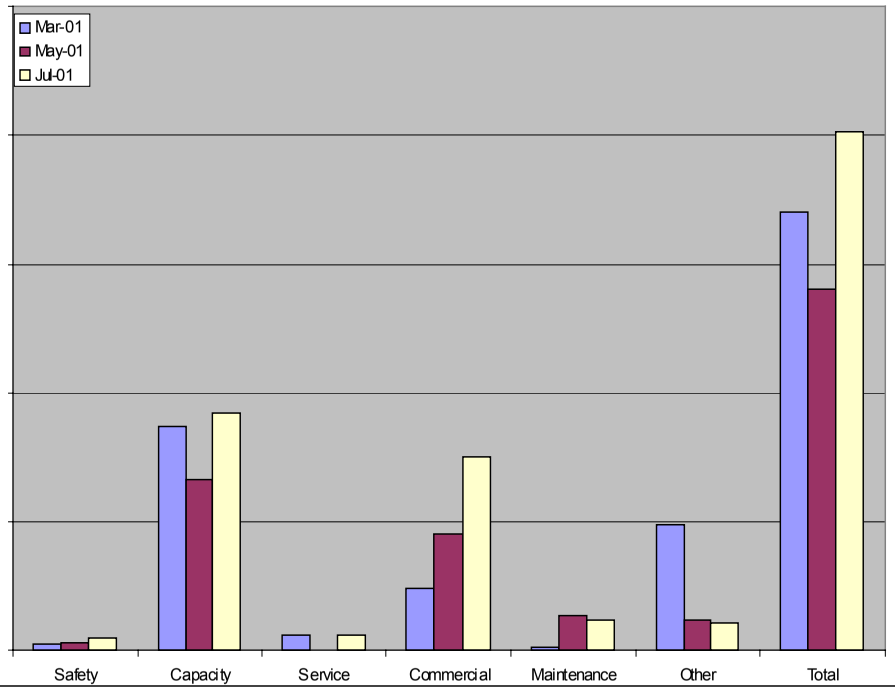
Commercial issues determined :

- Based on ART CAPEX list of commercial projects
- Based on industry common practices
- Costs from ART CAPEX both historic and future
- Capacity analysis for those facilities that are related to passenger growth for example auto parking

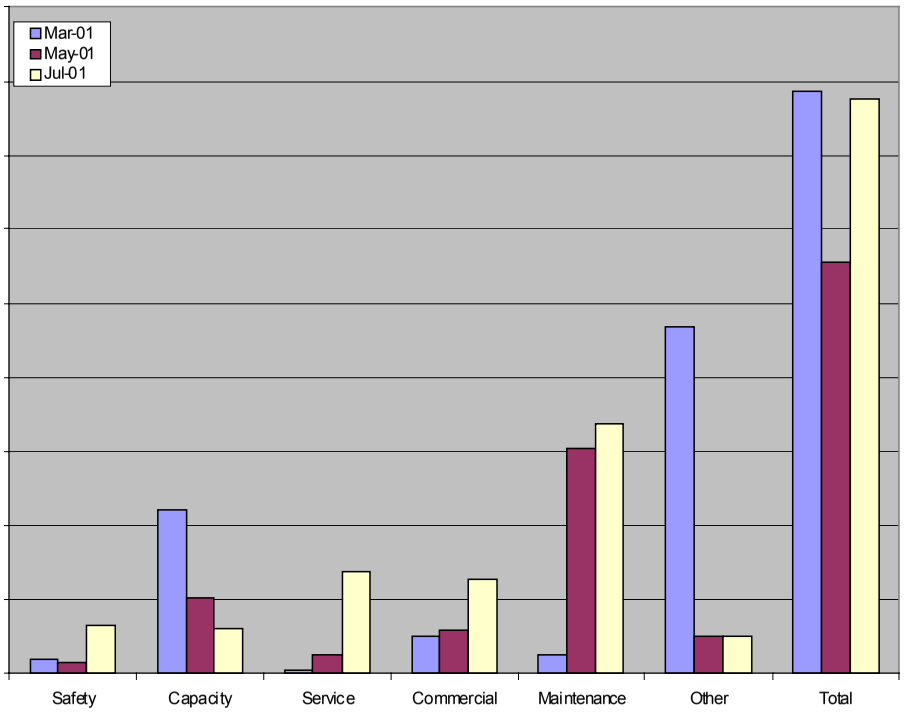
Other (Corporate, property, etc.....) issues determined :

- Based on ART CAPEX list of other projects
- Based on industry common practices
- Costs from ART CAPEX both historic and future

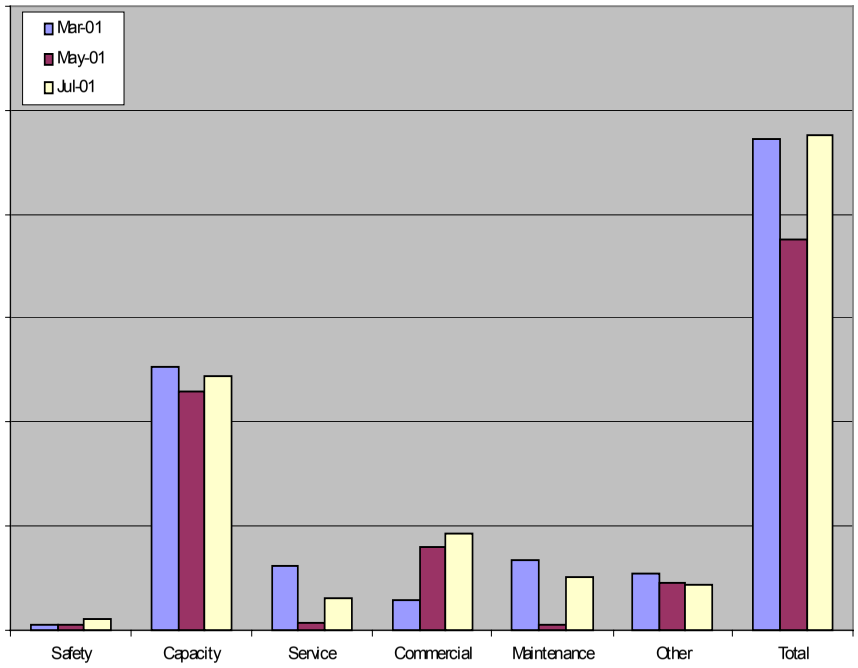
4. ART CAPEX 2001-2006



4. ART CAPEX 2001-2006



4. ART CAPEX 2001-2006



ART CAPEX Programme

Dublin	Type	2001	2,002	2,003	2,004	2,005	2,006	Total
	Land and Airside	13,284	31,003	13,039	69,450	52,400	53,950	233,126
	Terminal and Piers	20,068	23,525	54,050	42,400	42,450	10,000	192,493
	Airport Access	3,622	11,400	11,950	22,100	25,100	51,100	125,272
	Services/Business Infrastructure	3,871	20,550	3,700	1,900	18,900	5,300	54,221
	Commercial and Cargo Development	6,682	8,000	6,000	8,500	2,755	6,000	37,937
	Car/Coach/Taxi Parking	5,524	21,700	22,200	12,700	7,700	7,700	77,524
	Plant & Equipment and IT	10,448	3,779	5,369	5,409	5,479	6,009	36,493
Dublin Total Uninflated		**63,498**	**119,957**	**116,308**	**162,459**	**154,784**	**140,059**	**757,065**
Dublin Total Inflated		**63,498**	**129,434**	**134,281**	**198,818**	**198,707**	**186,276**	**911,013**

Shannon	Type	2001	2,002	2,003	2,004	2,005	2,006	Total
	Land and Airside	4,683	3,560	2,830	9,230	6,770	14,500	41,573
	Terminal and Piers	7,189	3,367	260	202	3,400	2,060	16,478
	Airport Access	-	-	-	-	-	3,000	3,000
	Services/Business Infrastructure	2,907	470	390	1,740	600	2,100	8,207
	Commercial and Cargo Development	8,254	-	1,050	4,600	700	-	14,604
	Car/Coach/Taxi Parking	-	300	400	-	350	2,000	3,050
	Plant & Equipment and IT	4,140	1,855	2,914	3,314	3,214	3,184	18,619
Shannon Total Uninflated		**27,173**	**9,552**	**7,844**	**19,086**	**15,034**	**26,844**	**105,531**
Shannon Total Inflated		**27,173**	**10,306**	**9,056**	**23,357**	**19,300**	**35,701**	**124,892**

Cork	Type	2001	2,002	2,003	2,004	2,005	2,006	Total
	Land and Airside	5,550	4,095	750	1,000	1,450	2,350	15,195
	Terminal and Piers	2,750	52,050	25,340	2,250	1,250	2,050	85,690
	Airport Access	1,000	1,000	800	-	700	700	4,200
	Services/Business Infrastructure	-	2,033	200	400	950	550	4,133
	Commercial and Cargo Development	2,100	1,300	-	500	1,000	1,200	6,100
	Car/Coach/Taxi Parking	3,000	6,200	2,405	300	300	200	12,405
	Plant & Equipment and IT	1,929	1,348	1,148	1,148	1,148	1,223	7,942
Cork Total Uninflated		**16,329**	**68,026**	**30,643**	**5,598**	**6,798**	**8,273**	**135,665**
Cork Total Inflated		**16,329**	**73,400**	**35,378**	**6,850**	**8,726**	**11,002**	**151,685**

Grand Total Uninflated		**107,000**	**197,534**	**154,794**	**187,142**	**176,615**	**175,175**	**998,260**
Grand Total Inflated		**107,000**	**213,139**	**178,714**	**229,025**	**226,733**	**232,980**	**1,187,591**

5. Comments on ART CAPEX

Description of the projects and their justification regarding cost and need was provided in the May 3, 2001 and July 26, 2001 submissions. CAPEX for various projects included in ART CAPEX were disallowed or modified because:

- Information provided regarding facility requirements was inadequate. That is, no demand/capacity analysis was included or technical information to justify need.

- No data was provided to allow IMG to compute requirements through the use of industry practices.

- Proposed size of facility exceeds demand requirements

- No information was provided regarding unit construction costs or project quantities that would allow verification of requested CAPEX

5. Comments on ART CAPEX (Cont.)

•Proposed unit cost was higher than industry standard or other unit costs used by ART for similar type of facilities

•Inadequate project description to allow verification of project need and cost from other sources or information provided by ART

•Type of project is commonly built by users or owner of the facilities

•Cost of project differs from costs shown on third party documentation provided by ART

•Construction timing is outside the five year CAPEX program

•Information is inconsistent with information previously provided

•No information was provided in latest CAPEX submission

6. Recoverable CAPEX

IMG proceeded, based on CAPEX drivers, to establish its own "recoverable" CAPEX considering:

- Safety
  - Airside related
  - Landside related
- Capacity
  - Airside related
  - Land side related
- Maintenance and repair
  - Airside related
  - Landside related
  - Commercial related
- Service
  - Safety related
  - Capacity related
  - Maintenance related
- Commercial
  - Safety related
  - Capacity related
  - Maintenance related

Dublin – Recoverable CAPEX 2001 - 2006

Project #	Description(Project Name)	Total
4-2 Other	**Property Projects** Taxi Parking ; maintenance; staff facilities; internal road upgrades	5,100
5 Commercial	**Commercial Projects** Ramp accommodation; atrium development; accommodation refurbishments	3,325
6 Internal Road	**Internal Road Restructuring** Planning / Compliance; Detailed design; construction	943
8-1 Car Parking	**Multi Storey Capacity** Planning / Compliance; Detailed design; construction; car parking maintenance program	9,624
12 General	**Terminal Projects** Compliance with immigration Req.; fire prevention Works (commercial and non-commercial); airbridges; operations control center; terminal refurbishments (commercial and non-commercial)I	19,014
13 Plant & Eq.	**Plant & Equipment projects** Holding Baggage Screening: heating and electrical infrastructure; communications system; environmental system; CHP/standby generator capacity; building management systems; information display systems; plant and equipment replacements	31,295

Dublin – Recoverable CAPEX 2001 – 2006 (cont.)

Project #	Description(Project Name)	Total
18 Other Airfield	**Airfield Projects** New Pier; fire tender replacement; construction of a rapid exit taxiway; provision of ground power services; changes and new stands for new pier; engine runup area; apron construction; overlay of runway	**56,479**
Airfield Capacity Projects	**Airfield Capacity Projects** Planning / compliance; detailed design and/or construction for: airfield projects; central apron IV; apron reconstruction; overlay taxiways; upgrade approach lights; ground power; Westlands -Executive jet apron; Pier C lead-in lights; slab replacement-airside pavement; six bay; additional 4000 spaces for Harristown; MSCP upgrade and maintenance; IAA extension	**21,250**
	Commercial Maintenance Projects Detailed design, construction for: refurbishment Heating and Ventilation; RIFT Replacement of Rescue 6; electricity distribution system	**8,663**
	Other Service Safety; Service Capacity and Maintenance CCTV ; fiber and copper network; noise tracking and monitoring	**547**
	Commercial Capacity Projects	**3,558**
Totals		**159,798**

Dublin – Recoverable CAPEX Summary

Description(Project Name)	2001	2002	2003	2004	2005	2006	Total
1 : Safety	16	1,008	12,500	5,410	861	0	19,796
2 : Capacity	7,725	17,386	21,782	2,333	0	4,469	53,694
3&1 : Service Safety	467	0	2,000	1,500	0	0	3,967
3&2 Service Capacity	0	0	2,400	0	0	0	2,400
3&5: Service Maintenance	0	420	0	0	0	0	420
4&2. Commercial Capacity	6,579	8,044	2,252	463	2,963	2,000	22,301
4&5 : Commercial Maintenance	2,396	2,850	295	2,295	2,251	1,426	11,513
5 : Maintenance and Repair	1,903	5,658	8,564	16,968	10,513	2,101	45,707
1+2+3+4+5	19,086	35,365	49,792	28,969	16,589	9,997	159,798

Shannon – Recoverable CAPEX 2001 - 2006

Project #	Description(Project Name)	Total
1- Land Airfield	**Land & Airfield Projects** Fire station relocation; reconstruction of apron/parking; taxiway and reconstruction of E1, E3 and East apron; upgrade 13/31; floodlighting-east apron; overlay to main runway; existing taxiway overlays & upgrades; east apron reconstruction; fire tenders	**28,561**
2- Terminal Comp.	**Terminal Projects** Terminal fire improvements; operations control centre; information display system; ceilings in transit and pier; Shannon terminal upgrade; PA system	**2,416**
3- Plant & Equipment	**Plant & Equipment Projects** Hold baggage Screening; telephone exchange; plant & equipment replacement programme	**6,683**
4- Commercial Prop.	**Commercial Property projects** Bar refurbishment; UPS hangar; cargo terminal	**2,161**
Other Property	**Property projects** River rescue; building demolition & road realignment; fiber optics ring; modification to check in the area; sewage treatment; fiber optic ring phase II; upgrade foul sewage system; upgrade electrical supply systems; surface water system;general upgrade to site infrastructure	**16,205**
Total		**56,027**

Shannon – Recoverable CAPEX Summary

Description(Project Name)	2001	2002	2003	2004	2005	2006	Total
1 : Safety	833	0	2,120	1,000	1,296	0	5,249
2 : Capacity	0	0	0	0	0	3000	3,000
3&1 : Service Safety	141	0	0	0	0	0	141
3&2 Service Capacity							0
3&5: Service Maintenance	0	500	600	0	0	0	1,100
4&2. Commercial Capacity	2,011	0	150	0	0	2,000	4,161
4&5 : Commercial Maintenance	0	0	0	0	0	0	0
5 : Maintenance and Repair	3,724	4,552	1,443	7,800	11,350	13,506	0
1+2+3+4+5	6,710	5,052	4,313	8,800	12,646	18,506	56,027

Cork – Recoverable CAPEX 2001 - 2006

Project #	Description(Project Name)	Total
Airfield	**Airfield Projects** Parallel Taxiway system phase I; cargo apron; link taxiway& north apron extension; general upgrade including lighting & equipment	**7,450** -
Land & Airfield	**Land & Airfield projects** Planning /complex; design; fire station; construction	**1,080**
Terminal Complexes	**Terminal Extension** Terminal Fire Upgrade; maintenance building; atrium development; baggage system; Terminal refurbishments & upgrades	**41,395**
Terminal Complexes	**Terminal Projects** Fire Vehicles; hold baggage screening; outgoing baggage alterations; plant & equipment replacement programme	**3,883**
Plant &Equipment	**Plant &Equipment projects** Operations and Airline Building	**1,000**
Commercial Prop.	**Commercial Property projects** Staff car park; roundabout & road upgrade; infrastructure development; general upgrade to site infrastructure	**1,838** **300**
Total		**56,646**

Cork Recoverable CAPEX Summary

Description(Project Name)	2001	2002	2003	2004	2005	2006	Total
1 : Safety	500	133	1,500	0	0	893	3,026
2 : Capacity	188	26,400	13,825	4,075	0	0	44,488
3&1 : Service Safety	0	0	0	0	0	0	0
3&2 Service Capacity	0	0	0	0	0	0	
3&5: Service Maintenance	0	0	0	0	0	0	
4&2. Commercial Capacity	0	0	0	1,000	0	300	1,300
4&5 : Commercial Maintenance	0	0	0	1,562	0	688	2,250
5 : Maintenance and Repair	0	2,167	2,791	0	625	0	5,583
1+2+3+4+5	688	28,700	18,116	6,637	625	1,880	56,646

7. Stranded Assets

Based on the demand/capacity study it was determined that various assets were built in excess of their requirements.

- Pier C Dublin
  - Average construction cost £ 2,576.7 per m^2 as of 2001
  - Average construction costs for similar buildings in Dublin: £ 2,100 per m^2
  - Excess cost : 22.6%
- Shannon terminal expansion of 10,800 m^2 exceeds by 21.2% the required space for the expansion areas covered under this project
- Number of required stands at Dublin for year 2005 is 59. Dublin currently has 65 stands, six more than those required by 2005

7. Stranded Assets

Pier C Excess

- Total constructed area Terminal West
  - Phase 1: 5,200 m^2 (Pier C) & 5,600 (terminal west). Completed in March 1998
  - Phase 2: 7,904 m^2 Completed in December 1999
- Construction Costs including fees:
  - Phase 1 : £ 31.1 million
  - Phase 2 : £ 19.3 million
- Unit costs:
  - Phase 1: £ 2314.8 = £ 2608.9 (2001)
  - Phase 2: £ 2441.80 = £ 2539.5 (2001)
  - Average: £ 2576.7 (2001)
- Average construction cost for similar buildings and ART cost estimates for similar projects £2,100
- Over cost of project 22.7%

7. Stranded Assets

Terminal Building Extension Shannon

- Total area provided in expansion of 10,800 will be sufficient to satisfy demand until 2009 based on ART busy hour
- If expansion was to be completed by 1999, design should have been made to satisfy demand of 2005. Based on ART space required should have been 8,913 m^2
- Area built is sufficient to satisfy traffic demand until 2009 based on forecast.
- Building was built 21.2% larger than needed

7. Stranded Assets

Dublin stands

- Capacity study indicates that current peak demand for stands is in the order of 55. Stand use time is above average in the industry
- Demand of stands by 2005 will be 59 and by 2010, 65. See demand/capacity study
- Another way to assess stand demand is through a correlation with the capacity of runway system. Several authors state that stand demand should be about 1.1 times capacity of runway system. Dublin runway system currently is at 40 and could be increased to 43. Using suggested approach number of stands would be 48. This number compared to the actual number obtained from flight schedules of 55 clearly indicates an inadequate use of stands.
- Dublin currently has 6 more stands than required by 2005

8. Assumptions, inputs and references

Reference Material

- Airport Master Plans
- Surface Transport Studies
- Airport Capacity Studies
- Annex 14 ICAO
- Airport Planning Manual - IATA
- Planning & Design of Airports by Horonjeff& McKelvey
- PKS Review 2001

Appendix A

Dublin CAPEX 2001 – 2006

In the following pages we provide a brief description of the projects included in the recoverable CAPEX programme. Justification for their need and cost are from the IMG capacity study, industry practices, Aer Rianta operational procedures and reasonable unit cost from similar previously built projects.

4-2 Other

11. Taxi Parking

The relocation of the taxi holding area is required to provide additional holding capability for taxis at the airport. The capacity of the current facility (145 spaces) is insufficient with regular overflow on the roadways adjacent to the holding area. The new facility will provide a total of 300 spaces.

12. Maintenance

Various maintenance projects are required to maintain facilities in proper working order. Refurbishment of equipment and other items is essential for the proper operation of the airport. Where items were allowed, cost was verified with industry and past project costs.

13. Staff Facilities

Childcare

With the increase in staff numbers there is a corresponding pressure on the child care facilities at the airport. As the existing crèche facilities lie within the red zone of the proposed parallel runway it is planned to relocate the facility

and develop a child care campus elsewhere to include after school facilities in line with Government policy.

Staff Restaurant

Dining facilities for staff at the airport are relatively limited. Distances to dining facilities off-site are becoming too great for staff to reach them within a reasonable time. The proposal to provide staff dining facilities in the terminal area will alleviate this problem and also reduce pressure on the main terminal catering facilities, which are provided primarily for the public.

14. Internal Road Upgrade

These projects provide not only for the refurbishment of existing assets at the end of their working lives, but also would, in line with developing standards include elements of safety, regulatory and environmental considerations such as:

- Segregation of passenger and vehicular movements
- Junction modifications
- Provision of traffic control / traffic calming measures
- Separation of traffic flows
  Provision of public transport friendly infrastructure and facilities

5 Commercial

15. Ramp Accommodation

The expansion of facilities at the airport and the continuing annual increase in air traffic movements requires the provision of further ramp accommodation to satisfy airline needs.

16. Atrium Development

Projects under consideration for the Atrium of the Multi Story Car Park are planned to relieve space within the terminal building by relocation of certain operations and to respond to a demand for retail outlets, which cannot be

satisfied within the terminal. Estimates are based on historic project costs carried out by Aer Rianta in this area and updated.

17. Accommodation Refurbishments

Relates to a provision for minor upgrade/refurbishment of accommodation, which has not been attended to in recent years.

6 Internal Road Restructuring

With the traffic growth, it will be necessary to increase the capacity of the internal road system. As per McCarthy and MVA reports, extensive work is required with grade separation.

8-1 Car Parking

18. Multi Story Capacity

Capacity study identified the need for an additional 200 short-term parking spaces within the next five years. These will be built by expanding the existing structure. Units cost were based on ART average cost for this type of facility.

9 Maintenance of Car Parks

This budget is to allow for the replacement of car park entry and exit equipment, overlay of surface car parks as required and general upgrading to maintain adequate service standards for customers, provision of CCTV and fence security system in Eastlands Car Park 5 to bring to similar standard of Eastlands Car Park 3. Provision of surface water attenuation facilities and final surfacing of the Eastlands Car Park. Estimate is based on figures received from McCarthy & Partners who carried out the original design.

12 General

19. Compliance with immigration req.

The capital expenditure associated with this category is required to be expended to ensure compliance with Immigration segregation requirements.

The requirements are onerous due to changes in the profile of passengers presenting for check-in and the physical layout of the piers at Dublin Airport.

In Pier A, arriving and departing passengers mix. In addition domestic, Common Travel Area passengers and International and other EU passengers are presented together at Immigration. The authorities now require full segregation of passengers at all new facilities and separate controlled presentation of CTA and other EU and International passengers. The budget allocated to the solution of these problems is a best estimate of what will be required to carry out alterations and is based on examination of similar segregation problems at Birmingham, Stanstead and other U.K. airports.

Associated cost was established based on the probable area that needs to be modified. Total area of Piers A and B is approximately 20,511 sm. An additional 5,000 sm. within the main terminal will also require refurbishment for separation of passengers. There is also a need to build a transit lounge.

20. Fire prevention Works (commercial & non-commercial)

Much of the Main Terminal Building was constructed prior to the introduction of the Building Regulations in 1992. An upgrade strategy for all public areas of the airport has been agreed with the County fire authorities. Works budgeted for under this heading are to carry out a fire protection strategy to enhance the safety of the buildings concerned.

21. Airbridge

Airbridges are provided to complement the operation of the Pier facilities. Some international airlines demand the use of airbridges for their operations. Based on the increasing number of international airlines that operate at the airport and the efforts being made to attract more demands additional air

bridges. Cost for bridge and installation appears reasonable within industry standards.

22. Operation Control Center

Centralization and rationalization of systems and the management of operational activities, together with provision for business continuity planning require the setting up of an operations control centre in order to ensure continued safe operations internally and externally.

23. Terminal Refurbishment

Extensive refurbishment of the older parts of the terminal building are required now that the 6 Bay Terminal Development is almost complete. These upgrades to layout, facilities, finishes and passenger flows will improve the overall efficiency of the terminal as a whole both for passengers, the general public and operations and bring the older section of the terminal up to the same level of service.

13 Plant & Equipment

24. Holding baggage Screening

Government policy requires the screening of all hold baggage, acting on recommendations from ICAO and ECAC. This is mandated to start in 2003. Costs appear to be reasonable due to high traffic volumes.

25. Heating & Electrical Infrastructure

These projects are directly related to ensuring that electrical and heating systems keep pace with the development of the airport and are available in a timely manner to support stakeholder requirements. The projects relate to re-investment to replace plant and networks. Significant sections of existing

networks have reached the end of their life. Budgets are based on historic costs derived from other similar projects at the airport.

26. Communications Systems

Improvement in the active network systems throughout the airports is essential to keep pace with increasing passenger numbers as forecast. This encompasses installation of the required technologies in PC's, Internet hubs, and e-mail servers. There is initial front loaded expenditure required to update existing systems to modern standards. The cost estimates are based on a scope of equipment replacement benchmarked against previous projects at this and other airports.

27. CHP / Standby Generator Capacity

Electricity demand will increase in line with the increase in the passenger numbers. The initial expenditure to 2005 will cater for demand to that date. Life cycle replacement will require funding from 2005 to 2010. CHP is an energy efficient system in line with company policy, which facilitates the achievement of lower energy costs.

The budgets are based on recent tendering experience and supplier estimations.

28. Building Management Systems

This system is required to provide more precise control over environmental systems within the terminal building. This will improve comfort levels for the public and contribute to overall efficiencies of the system.

Information Display Systems

Developments in technology, the further expansion of the terminal areas and alterations to passenger flows requires continued provision of Flight Information Display Units, essential for the comfort and facilitation of the general public and passengers. The plan assumes continuous provision of hardware and software integration and standardization of existing Flight Information Displays.

Plan & Equipment Replacement

The budgeted capital investment streams associated with Plant and Equipment and outlined in the Company's capital investment plan have been prepared by the individual airports on the basis of each airport's Planned Maintenance Schedule. The Schedules are prepared on the basis of the useful life of the plant or equipment, which dictates the timing for replacement. Included also are budgets for replacement upgrade or overhaul which are anticipated from experience to occur from time to time to particular types of plant and equipment. Examples of the Plant and Equipment covered under this section are vehicles, office equipment, cleaning and maintenance equipment.

Pier Expansion

These provisions are to cover refurbishment and upgrade of the public areas, excluding retail areas of the piers A and B. IMG capacity study indicates that approximately 13,650 sm. will be required to satisfy the demand requirements

by year 2006. Unit cost was determined from the PKS Review Report for 2001.

29. Fire Tender Replacement

Replacement of fire tenders is not common practice in the industry. Maintenance and repair of equipment is a more common practice. Costs have been allowed to reflect this suggestion.

30. Construction of a Rapid exit taxiway

Dublin Airport is operating at an average peak of 38 aircraft movements per hour this year. IMG capacity study recommends that in order to improve airfield capacity to the levels of other similar airports improvements must be made to speed aircraft evacuating the runway. A key component of delivering this efficiency is the construction of a Rapid Exit Taxiway, which could l increase runway efficiency by 3 - 5%.

The area of pavement required is expected to be about 15,000 m². Taxiway lighting compatible with the CAT 2/3 will be required. Because the project is located adjacent to Runway 10/28, the work will be carried out entirely at night over different shifts. This adds to the cost of the project, which includes pavement, lighting, night work and shift work. Cost is based on other similar projects conducted by ART in the recent past.

31. Provision of ground power services

Provision of ground power services under loading bridges is a common practice at airports that experience congestion in the apron areas. Safety and environmental concerns on the use of mobile units are being addressed with this investment.

32. Changes and New Stands for New Pier

As part of the construction of new facilities to alleviate congestion at Dublin Airport stands will need to be remarked and pavement repaired and built. Pier will have 16 stands of approx. 5000 sm. each. Cost reflects repair, reinforcement additional pavements.

33. Engine run up Area

Required to reduce the noise impact of ground running of aircraft engines. This is becoming an increasing demand from airlines and the local communities because of the volume of run-ups and the time limitations currently imposed. It is also a key environmental improvement as most complaints refer to these activities. This is a specially constructed facility. Costs of this kind of facilities are considerably lower than those proposed by Aer Rianta.

34. Apron Reconstruction

This project involves the replacement of 60,000 m² of life expired concrete pavement constituting 11 existing contact stands. It will be necessary to break up and remove the existing pavement and provide new pavement in its place.

35. Overlay of Runway & Taxiway

Reconstruction and/or overlay of life expired pavements, including taxiways A, P1, P2, H1 and H2 and Runway 10/28 and 16/34. An area of 146,000 m² is anticipated to need remedial works.

36. New Parallel Runway

IMG capacity study suggests that the need for the new runway can be delayed until after 2010 if improvements are made to the existing airfield by providing a high speed exit taxiway and changes in some of the current landing and takeoff standards. Cost for planning and initial design and permitting work appear reasonable.

37. Apron Reconstruction

This project involves the replacement of 60,000 m² of life expired concrete pavement constituting 11 existing contact stands. It will be necessary to break up and remove the existing pavement and provide new pavement in its place.

38. Upgrade Approach Lights

Lighting systems need to be regularly upgraded on a planned basis to maintain safety and operational efficiency.

39. Westlands- Executive Jet Apron

Master plan indicates the need to build apron to cater for executive jets that are becoming more common at the airport.

40. Six Bay

Project is under construction. Capacity study indicated the need to have this project built. Actual construction cost was within industry standards.

41. Additional 4000 Spaces at Harristown

Capacity study indicates the need for an additional 2,000 spaces by 2006.

42. Multi Storey Car Parking Upgrade and Maintenance

There are approximately 2500 multi story car parking spaces at Dublin Airport. This budget proposal relates to provisions for planned maintenance of the facility including lighting, signage and equipment to ensure upgrade to maintain an adequate standard of car parking for customers.

43. IAA Extension

This is a commercial project driven by the necessary re-equipment and expansion program of the Irish Aviation Authority. The re-equipment and expansion program will contribute to the overall operational efficiency of the airspace.

44. Electricity Distribution System

The rapid expansion of the airport with consequent demands on electricity supply both for power and communications systems requires constant development of the network to satisfy all stakeholder demands. This project is work within airport property and is the responsibility of ART.

45. CCTV

This provision is necessary to upgrade the security systems in the terminal to conform to requirements of the National Civil Aviation Security Committee (NCASC) and it is in line with continual review and upgrade of security systems at the Airport.

46. Fiber and Copper Network

Projects in this category relate to the networks required to distribute voice / data generated on the communications systems. Improvement in the communications networks throughout the airport by improving capacity and efficiency of the networks facilitates operations and operational management both for the airport authority and other stakeholders on the site. Up to date networks are essential for modern business operations for all stakeholders.

47. Noise Tracking and Monitoring

Required for the development of systems to attempt to ensure that aircraft comply with procedures to minimize the effects of aircraft noise, which is a significant concern for local communities.

48. Corballis Way/132

This project will provide additional entrance/exit from the R132 to the airport, with a new junction. This project includes traffic lights, refurbishing existing pavement. The total area is 8,400 m². Cost of this work was determined from the McCarthy study.

49. Westlink North Corballis Additional Lanes

This project will increase the capacity of the Westlink Road and will provide a dedicated entrance to the coach park and a free flow egress from the Short Term Car Park. This work will be carried out at surface level. The total area is 4,800 m².

Cork CAPEX 2001-2006

Cargo Apron

In line with the Master Plan and IMG's capacity study it will be necessary to move the existing cargo apron to the south side of runway 07/25. The area of the apron will be approximately 32,000sm.

Link Taxiway and North Apron Extension

This project, which is currently underway, involves the construction of a major extension to the North Apron (39,000 m²), a new Taxiway linking Runway 17 with the North Apron, a widening of Taxiway C to accommodate wide bodied aircraft, a widening of the turnaround area on Runway 35 and the reconfiguration of the existing aircraft parking stands. New apron pavement will accommodate 3 new aircraft parking stands. The reconfiguration of the existing aircraft stand layout will provide an additional two parking stands.

Fire Station

An extension to the existing fire station is necessary to provide protection for a fire tender at present being maintained in the open and to reorganize the station to achieve greater operational efficiency. Size of facility was determined based on ICAO recommendations and industry practices. Size of new building should be approximately 425 sm.

Terminal Extension

IMG capacity study indicates that the current passenger terminal is above its capacity. IMG analysis indicates that approximately 14,300 additional space will be required. Unit cost from PKS was used to determine cost.

Terminal Fire Upgrade

Much of the Existing Terminal Building was constructed prior to the introduction of the Building Regulations in 1992. An upgrade strategy for all public areas of the airport has been agreed with the County Fire authorities. Works budgeted for under this heading are to carry out the fire protection strategy to enhance the safety of the buildings concerned.

Maintenance Building

The terminal development programme dictates the early relocation of the existing maintenance facility building. A site has been identified for the relocation consistent with the master plan proposals for the airport.

Baggage System Alterations

This project is part of the Terminal Development Programme. Baggage system needs to conform to terminal expansion.

Terminal Refurbishment and upgrades

This project is part of the Terminal Development Programme and includes the refurbishment of several areas within the existing terminal. Area to be refurbished is approximately 1000 sm.

Fire Tenders

Tenders will be refurbished and improved to comply with ICAO recommendations.

Hold Baggage Screening

This project refers to the installation of 100% hold baggage screening in the terminal building, which must be completed by 2003 under the Government policy. This project will become part of the Terminal Development Programme.

Baggage System Alterations

This project is part of the Terminal Development Programme.

Plant and Equipment

For adequate operation of the airport it is important to renew and update plant or equipment. Examples of the Plant and equipment covered under this section are vehicles, office equipment, cleaning and maintenance equipment.

Operations and Airline Buildings

Need to increase capacity of operations and airline offices are directly tied to passenger and aircraft operations growth.

It is anticipated that an additional 60 sm. will be needed by 2006

Staff Car Park

About 250 staff parking spaces will be required due to traffic growth.

Roundabout and road upgrading

Facilitates provision on increased terminal capacity in line with traffic by clearing land required for, and provision of access to, that development. About 10,000 m² of new pavement is required, including street lighting. There are also major quantities of earthworks and rock excavation and extensive diversion of services involved.

Infrastructure Development

Development of various services infrastructure at Cork Airport is required to facilitate the planned expansion of the passenger terminal building and associated works.

General Upgrades to Site Infrastructure

Projects under this heading relate to the upgrade of utilities, water, sewerage, drainage, electricity, gas and communications. They are required to satisfy growth in demand. The budget estimates are based on Aer Rianta engineering estimates of work required, cost information on previous projects and consultancy assistance in terms of scope of work, costings, surveys and monitoring.

Shannon CAPEX 2001-2006

Fire Station Relocation

The master plan for Shannon calls for a relocation of the Fire Station to be better able to reach all points of the airfield within ICAO's requirements set in Annex 14 to the Chicago Convention, 1944. The current fire station was constructed for a smaller airfield. The size of the building based on ICAO and industry standards is 540 sm. Unit cost were determined from the PKS report.

Reconstruction of apron / parking

Condition of various areas of pavement demand reconstruction of apron and stands. It has been identified that approximately 50,000 sm. of pavement will be repaired.

Taxiway and reconstruction of E2,E3 and East Apron

Pavement condition and the need to provide adequate access to the airports main runway demand the reconstruction and overlay of various taxiways and aprons. It is anticipated that approximately 25,000 sm. of pavement will be reconstructed and rehabilitated.

Upgrade Runway 13/31

The upgrade of Runway 13/31 at Shannon is recommended in the airport Master Plan and supported by the IAA to be of strategic importance to maintain the viability of Shannon Airport. The project includes work to upgrade the pavement and installation of lights.

Floodlighting

Safety of personnel working on the apron during hours of darkness is to be improved by provision of area floodlighting.

Runway Overlay

The airports main runway 06-24 will require an overlay within the next 3 to 5 years. Runway 06-24 is 3199 m long and 45 m wide. Additionally Taxiway A, D1 and D2 will also be overlaid. D1 and D2 are the main taxi routes in the

airfield. Ground conditions under the taxiways D1 and D2 are very poor, which has lead to major deterioration of these pavements and total reconstruction of about 20,000 m² of pavement.

East Apron Reconstruction

The East Apron is 50 years old and many areas now need reconstruction. The older sections of the West Apron, which are over 30 years old, are subject to wide body traffic and are also in need of remedial work. About 100,000 m² of apron reconstruction will be required.

Fire Tenders

Fire tenders will need major repairs and overhauls during the next five years.

The cost estimation for the above projects is based on most recent costs for similar items, consultants' advice and generally available information.

Terminal Fire Improvements

Much of the Main Terminal Building was constructed prior to the introduction of the Building Regulations in 1992. An upgrade strategy for all public areas of the airport has been agreed with the County fire authorities. Works budgeted for under this heading are to carry out the fire protection strategy to enhance the safety of the buildings concerned.

Operations Control Centre

With the advent of multiple ground handling agents at the airport and the consequent increase in apron vehicular traffic and the necessity for Aer Rianta to carry out stand planning/allocation rather than Aer Lingus as heretofore, it has become necessary to provide a specialist apron control unit and systems to ensure management of operations on the ramps. A control centre is necessary to monitor all activity on the ramp. This provision is to cover the setting up of this centre.

Information Display Units

Developments in technology and alterations to passenger flows and building layouts requires continued provision for sophisticated Flight Information

Display Units, essential for the comfort and facilitation of the general public and passengers. This investment includes hardware and the integration and standardization of existing systems.

Cost estimates for all of the above are based on similar projects undertaken over the last 2 years.

Ceilings in Transit Lounge and Pier

The ceilings in the Transit Lounge and Pier were installed when the building was constructed in the late 1960s. The upgrade of the building to a standard consistent with the new extension requires the installation of new ceiling systems in these areas. They are timed to coincide with planned work to mechanical and electrical services in the voids above.

Terminal Building Refurbishment and Upgrade

The Terminal Building Refurbishment and Upgrade programme is budgeted to allow for projects associated with the continued modernization of the old terminal, to ensure that system, finishes, passenger flows and the general facility itself is brought up to the standard of the new extension for the benefit of passengers and other stakeholders. It is also anticipated that modifications will be required to the transit area, the link corridor building and various back of house operational areas at Departures level.

Departures Floor Lighting Upgrade

This allocation is to cover the modernization of the lighting systems on the departures level of the terminal building. A new system will be more cost effective to run and maintain.

Plant and Equipment

Proper maintenance, repair and replacement of plant and equipment are essential for the proper operation of the airport. Budgets for replacement upgrade or overhaul, which are anticipated from previous years expenditures. Examples of the Plant and equipment covered under this section are vehicles, office equipment, cleaning and maintenance equipment.

UPS Hangar and Cargo Terminal

IMG capacity study identified the need to expand cargo facilities within the next five years. It is expected that demand for cargo facilities will double by year 2010. Construction costs were obtained from the PKS report.

River Rescue

ICAO demands the provision of adequate river (water) rescue facilities at airports such as Shannon in very close proximity of major water bodies.

Fibre Optic Ring

Projects in this category relate to the networks required to distribute voice/data generated on the communications systems. Improvement in the communications networks throughout the airport by improving capacity and efficiency of the networks facilitates operations and operational management both for the airport authority and other stakeholders on the site. Up to date networks are essential for modern business operations for all stakeholders.

Sewage Treatment

Expansion of Airport facilities requires expansion of the sewage treatment facilities to maintain sustainable environmental standards.

Upgrade Foul Sewage System / Upgrade Electrical Supply System General Upgrade to site Infrastructure

For all the above projects at each of the three airports, the following considerations apply. Projects in this category relate to the upgrade of all utilities, water, sewerage, drainage, electricity, gas and communications. They are required to deal with growth in demand based on continuous assessment of capacity of infrastructure and capacity constraints of local authority systems. The budget estimates are based on Aer Rianta engineering estimates of work required, cost information on previous projects and consultancy assistance in terms of scope of work, costings, surveys and monitoring.

APPENDIX V TO CP8

IMG Capacity Analysis

Commission for Aviation Regulation

Capacity Analysis

August 21, 2001

Infrastructure Management Group, Inc.

Capacity Analysis
(***Input Information)***

- Traffic Data:
  - Passengers
    - Annual
    - Peak hour
    - 5% Busy Hour
  - Operations
    - Annual
    - Peak hour
    - Type
    - Turn around times
  - Cargo
    - Annual
  - Vehicles
    - Annual
    - Peak hour

- Characteristics of the Facilities
  - Airside
    - Number and size of different components
      - » Runway
      - » Taxiways
      - » Stands
  - Landside
    - Passenger terminal
      - » Dimensions of:
        - ✓ Operational areas
        - ✓ Commercial areas

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Capacity Analysis

(***Input Information (cont.)***)

- Characteristics of the Facilities
  - Landside
    - Cargo terminals
      - Size of operational areas
    - Parking
      - Number of spaces by type
    - Roads
      - Dimensions
- Operational data
  - Performance
  - Throughput
  - Level of service
  - Set standards
    - ICAO
    - IATA
    - IAA
    - ART

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Capacity Analysis

(Source of Information)

- Aer Rianta
- Aer Lingus
- Ryanair
- IATA
- ICAO
- EUROCONTROL
- FAA
- IAA
- ACI

Background – Peak Hour Analysis

- The peak-hour analysis included in this report reflects commercial operations at Dublin, Shannon and Cork.
- IMG did not receive hourly data for operations such as GA, Cargo and Training. It is assumed that these operations would operate off-peak.
- The databases did not include flight ID numbers. Domestic flights that become international flights may be double counted in the electronic data. IMG attempted to identify these flights and minimize the margin of error.
- Airline Gate usage for Piers A, B and C at Dublin were revised based on information provided to IMG by CAR
- Database for Cork did not include all commercial flights. This difference was adjusted parametrically.

Purpose

The purpose of peak-hour analysis in the context of an airport is to determine the existing and future levels of demand, and translate them into planning criteria. The elements included in the analysis are:

- Annual throughput of passengers at a given time
  - International and domestic
  - Arrivals and departures
- Number and type of aircraft served by the airport at a given time
- Size of areas of the terminal – customs, concessions, counter space, etc.
- Size of the aircraft parking apron and all airside requirements
- Access roads and parking

High Level Methodology

- According to ICAO's Master Planning Manual DOC 9184-AN/902, the "peak hour" is accepted as the 30th or 40th busy hour, not the peak hour for the year.
- This methodology prevents airport planners from using data anomalies that could cause a temporary spike in peak demand and create unnecessary requirements in the long-term, and is consistent with previous peak-hour assessments
- Most of the team's attention focused on the annual throughput of passengers (international and domestic) as well as the number of operations and traffic mix.
- In the case of Dublin's Airport, 4 peaks are derived: One for each Pier and a global peak for the airport.

Methodology - Peak-Hour Passengers

- It is important to segregate passengers into the following categories:
  - Domestic and International
  - Arrivals, Transit, and Departures

- All data has been classified in 15-Minute Intervals to calculate hourly capacity in a moving basis as well as ratios

- Based on the electronic data for all commercial operations for the year 2000, a typical peak-day was selected for each airport. This selection is based on criteria that the average day of the two busiest months of the year (July and August) would represent the true peak-hour for the airport, assuming a normal distribution.
  - Dublin – July 21
  - Shannon – August 3
  - Cork – August 9

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Methodology - Peak-Hour Passengers (Cont.)

- All operations were classified into the following categories:
  - A - Two engine narrow body jet
  - B - Two-engine wide body jet
  - C - Three-engine narrow body jet
  - D - Three-engine wide body jet
  - E - Four-engine narrow body jet
  - F - Four-engine wide body jet
  - G - Turboprops with more than 20 seats
  - H - Turboprops with less than 20 seats

- Full aircraft seat load capacity vs. actual load are presented. According to BOEING's 2000 Current Market Outlook, Northern Europe has achieved an average load factor of 72%.

- A load factor of 85% is assumed for peak-hour operations

Other Assumptions

- Time in Terminal Assumptions:
  - Domestic Departing Passengers – 60 Min.
  - Domestic Arriving Passengers – 60 Min.
  - International Departing Passenger – 1.5
  - International Arriving Passengers – 1 Hr.
- Electronic data for Cork did not include over 6.000 commercial flights (equivalent to 25% of the data). IMG adjusted the available data to develop the peak hour operations for this airport using a 25% factor.

Dublin Airport – A Very Special Case …

Pier	1995	1996	1997	1998	1999	2000
Pier A	42.50%	46.83%	50.23%	47.48%	47.11%	46.17%
Pier B	56.85%	52.73%	49.43%	41.90%	37.87%	35.26%
Pier C	0.00%	0.00%	0.00%	10.24%	14.53%	18.23%
North Terminal	0.03%	0.04%	0.02%	0.01%	0.01%	0.01%
Unassigned	0.62%	0.41%	0.33%	0.36%	0.47%	0.33%

NOTE: Pier usage throughout the day is not proportional

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Peak-Hour Passengers Analysis Summary

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Pier A - Dublin – Passenger Peak-Hour Results

Dublin - Pier A Only

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	1						4		5	323	275
2005	1						5		6	370	314
2010	2						5		7	507	431
2015	2						6		8	553	470
2020	3						6		9	690	587

13:15-14:15

Arrivals - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	7				3		1		11	1288	1095
2005	8				4		1		13	1519	1292
2010	9				5		1		15	1751	1488
2015	11				5		2		18	2071	1760
2020	12				6		2		20	2302	1957

20:00-21:00

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	7				3		1		11	1288	1095
2005	9				4		1		14	1656	1408
2010	11				5		2		18	2071	1760
2015	12				5		2		19	2208	1877
2020	12				6		3		21	2349	1997

20:00-2 No Domestic Flights in this peak

Departures - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	1	1					4		6	638	542
2005	1	1					5		7	684	582
2010	1	2					5		8	998	849
2015	2	2					5		9	1135	965
2020	2	3					6		11	1496	1272

11:45-12:45

Departures - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	11				2		2		15	1787	1519
2005	14				2		2		18	2198	1868
2010	15				3		3		21	2476	2105
2015	16				4		4		24	2754	2341
2020	17				4		4		25	2891	2457

6:00-7:00

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	11				2		3		16	1834	1559
2005	13				3		3		19	2202	1872
2010	15				4		4		23	2617	2225
2015	16				4		5		25	2801	2380
2020	17				5		5		27	3032	2577

6:00-7:00

PAX								
	A	B	C	D	E	F	G	H
	137	314	132	311	95		47	19

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Combined Peak

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	12				2		4		18	2017	1715
2005	14				3		4		21	2386	2028
2010	16				4		5		25	2801	2380
2015	18				4		5		27	3074	2613
2020	20				6		6		32	3584	3046

6:00-7:00

Infrastructure Management Group, Inc. # 13

Pier B - Dublin – Passenger Peak-Hour Results

Dublin - Pier B Only

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total OPS	Full Load	85% Load
2000							3		3	140	119
2005							4		4	186	158
2010							5		5	233	198
2015							5		5	233	198
2020							6		6	280	238

12:45-13:45

Arrivals - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	6			1	2		2		11	1414	1202
2005	7			2	2		2		13	1861	1582
2010	8			2	3		2		15	2092	1779
2015	9			3	3		4		19	2633	2238
2020	10			3	4		4		21	2864	2435

9:00 - 10:00

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	6	1		1	2		2		12	1728	1469
2005	7	1		2	2		2		14	2175	1849
2010	8	1		2	3		2		16	2407	2046
2015	9	2		3	3		4		21	3262	2772
2020	10	2		3	4		4		23	3493	2969

9:00 - 10:00

Departures - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000		1		1			3		5	765	650
2005		2		2			4		8	1436	1221
2010		2		2			5		9	1483	1260
2015		3		2			5		10	1797	1527
2020		3		3			5		11	2107	1791

11:30-12:30

Departures - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	10				4		3		17	1886	1603
2005	14				5		4		23	2575	2189
2010	16				6		5		27	2990	2541
2015	17				7		6		30	3268	2777
2020	18				7		7		32	3451	2933

6:00 - 7:00

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	10				4		3		17	1886	1603
2005	14				5		4		23	2575	2189
2010	16				6		5		27	2990	2541
2015	17				7		6		30	3268	2777
2020	18				7		7		32	3451	2933

6:00 - 7:00

PAX								
	A	B	C	D	E	F	G	H
	137	314	132	311	95		47	19

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Combined Peak

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	12			5			5		22	2348	1996
2005	16			6			6		28	3036	2581
2010	18			7			7		32	3451	2933
2015	20			7			8		35	3771	3206
2020	21			8			8		37	4003	3402

6:00 - 7:00

Infrastructure Management Group, Inc. # 14

Pier C - Dublin – Passenger Peak-Hour Results

Dublin - Pier C Only

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total	OPS	Full Load	85% Load
2000	1						2		3	230	196	
2005	1						3		4	277	235	
2010	2						3		5	414	351	
2015	2						4		6	460	391	
2020	3						4		7	597	507	

13:15 - 14:15

Arrivals - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	8						3		11	1234	1049	
2005	10						4		14	1555	1322	
2010	11						5		16	1738	1477	
2015	12						6		18	1922	1633	
2020	13						7		20	2105	1789	

10:30-11:30

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	8						4		12	1281	1089	
2005	10						6		16	1648	1401	
2010	11						7		18	1831	1557	
2015	12						8		20	2015	1713	
2020	13						9		22	2198	1869	

10:30-11:30

Departures - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000							2		2	93	79	
2005							3		3	140	119	
2010							3		3	140	119	
2015							4		4	186	158	
2020							4		4	186	158	

11:30-12:30

Departures - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	7				2		1		10	1194	1014	
2005	9				2		2		13	1514	1287	
2010	10				3		3		16	1792	1523	
2015	11				4		4		19	2070	1759	
2020	12				4		4		20	2207	1876	

10:45-11:45

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	7				2		3		12	1287	1094	
2005	9				2		5		16	1654	1406	
2010	10				3		6		19	1932	1642	
2015	11				4		7		22	2210	1878	
2020	12				4		8		24	2393	2034	

10:45-11:45

PAX							
A	B	C	D	E	F	G	H
137	314	132	311	95		47	19

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Combined Peak

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	10	1		1			5		17	2010	1709	
2005	12	1		2			6		21	2425	2061	
2010	13	2		3			6		24	2971	2525	
2015	14	2		3			7		26	3154	2681	
2020	15	3		4			7		29	3700	3145	

10:30-11:30

Infrastructure Management Group, Inc. # 15

All Piers - Passenger Peak-Hour Dublin

All Piers Combined - Dublin

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	2						6		8	553	470
2005	3						9		12	830	706
2010	4						9		13	967	822
2015	4						10		14	1013	861
2020	4						11		15	1060	901

13:13 -14:30

Arrivals - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	16	1	1	0	1		3		22	2,870	2439
2005	21	1	1	0	1		4		29	3,710	3153
2010	24	2	2	0	2		5		34	4,382	3725
2015	27	2	2	0	2		6		38	4,826	4102
2020	29	2	2	0	2		6		40	5,146	4374

10:30-11:30

Arrivals (Int'l and Domestic)

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	16	1	1	0	1		4		23	2,916	2479
2005	21	1	1	0	1		5.2		30	3,764	3199
2010	24	2	2	0	2		6.1		35	4,433	3768
2015	27	2	2	0	2		6.7		38	4,857	4128
2020	29	2	2	0	2		7.1		41	5,199	4419

10:30-11:30
Unconstraint Arrivals

Departures - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	1	1		1			5		8	995	845
2005	1	1		1			6		9	1041	885
2010	1	1		1			7		10	1088	925
2015	2	2		2			8		14	1896	1612
2020	2	2		2			9		15	1943	1651

11:15 - 12:15

Departures - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	25				5		3		33	4,033	3428
2005	28				6		4		38	4,585	3897
2010	32				6		4		42	5,132	4362
2015	38				8		6		52	6,236	5300
2020	42				8		6		56	6,783	5765

5:45-6:45

Departures (Int'l and Domestic)

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	25				5		5		35	4,126	3508
2005	29				6		5.8		40	4,761	4047
2010	32				6		6.5		45	5,326	4527
2015	38				8		7.6		53	6,272	5331
2020	42				8		8.3		58	6,872	5841

5:45-6:45
Constrained Departures through 2005

PAX

A	B	C	D	E	F	G	H
137	314	132	311	95		47	19

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Global Peak Ops (Departures & Arrivals) - PAX

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	31	3	1		12		12	1	60	7029	5974
2005	34	3	1		13		13	1	65	7580	6443
2010	40	4	1		15		15	1	76	8998	7648
2015	47	5	2		18		18	2	92	10844	9217
2020	51	5	2		20		20	2	100	11674	9923

5:45-6:45

Infrastructure Management Group, Inc. # 16

Passenger Peak-Hour Shannon

SHANNON PAX

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000		1			1		1		3	455	387
2005		2			1		2		5	816	694
2010		2			2		2		6	911	774
2015		3			2		3		8	1272	1081
2020		3			3		3		9	1366	1161

6:00-7:00

Arrivals - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	3	2					1		6	1086	923
2005	4	3					1		8	1537	1306
2010	4	3					2		9	1583	1346
2015	4	4					2		10	1897	1613
2020	5	4					2		11	2034	1729

6:30-7:30

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	3	3		1		2			9	1541	1310
2005	4	3		1		2			10	1678	1426
2010	4	4		1		2			11	1992	1693
2015	4	4		2		2			12	2087	1774
2020	5	4		2		3			14	2270	1930

6:30-7:30

Departures - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	1			1					2	447	380
2005	2			1					3	584	497
2010	2			2					4	895	760
2015	2			2					4	895	760
2020	3			3					6	1342	1141

8:30-9:30 OR 8:45-9:45

Departures - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	3	5				1			9	1982	1684
2005	4	5				1	1		11	2165	1840
2010	4	6				1	2		13	2526	2147
2015	4	6				1	2		13	2526	2147
2020	4	6				1	2		13	2526	2147

16:15-17:15

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	3	5				1	1		10	2028	1724
2005	4	5				1	2		12	2212	1880
2010	4	6				1	3		14	2573	2187
2015	4	6				1	3		14	2573	2187
2020	4	6				1	3		14	2573	2187

16:15-17:15

PAX

A	B	C	D	E	F	G	H
137	314	132	311	95	36	47	19

A Two engine narrow body jet
B Two-engine wide body jet
C Three-engine narrow body jet
D Three-engine wide body jet
E Four-engine narrow body jet
F Four-engine wide body jet
G Turboprops with more than 20 seats
H Turboprops with less than 20 seats

Global Peak

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	4	8		1	2	1			16	3202	2722
2005	5	8		1	2	2			18	3386	2878
2010	5	9		2	2	3			21	3841	3265
2015	5	9		2	2	3			21	3841	3265
2020	6	9		3	2	3			23	4073	3462

16:15-17:15

Infrastructure Management Group, Inc. # 17

Passenger Peak-Hour Cork

Cork - PAX Summary

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total OPS	Full Load	85% Load
2000	1						3		4	277	235
2005	1						4		5	323	275
2010	2						4		6	460	391
2015	2						4		6	460	391
2020	2						4		6	460	391

12:00-13:00

Arrivals - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	4				1		2		7	735	625
2005	5				1		3		9	919	781
2010	5				1		4		10	965	820
2015	5				2		4		11	1060	901
2020	5				2		4		11	1060	901

9:15-10:15

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	4				1		2		7	735	625
2005	5				1		3		9	919	781
2010	5				1		4		10	965	820
2015	5				2		4		11	1060	901
2020	5				2		4		11	1060	901

12:30-13:30

Departures - Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	1						1		2	183	156
2005	1						3		4	277	235
2010	2						3		5	414	351
2015	3						3		6	550	468
2020	3						3		6	550	468

13:15-14:15

Departures - International

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	4						2		6	641	544
2005	4				1		3		8	782	664
2010	5				1		3		9	919	781
2015	5				2		3		10	1013	861
2020	5				2		3		10	1013	861

10:30-11:30

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	4				2		1		7	783	666
2005	5				2		2		9	966	821
2010	6				2		2		10	1103	938
2015	6				3		2		11	1198	1018
2020	6				3		2		11	1198	1018

10:30-11:30

Global Peak

	A	B	C	D	E	F	G	H	Total	Full Load	85% Load
2000	5				2		1		8	920	782
2005	5				3		2		10	1061	902
2010	6				3		2		11	1198	1018
2015	6				4		2		12	1292	1099
2020	6				4		3		13	1339	1138

10:30-11:30

PAX

A	B	C	D	E	F	G	H
137	314	132	311	95		47	19

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Infrastructure Management Group, Inc. # 18

Peak-Hour Operations Analysis Summary

Infrastructure
Management Group, Inc.

Pier A - Dublin – Operations Peak-Hour Results

Dublin - Pier A Operations Only

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total
2000	1						4		5
2005	1						5		6
2010	2						5		7
2015	2						6		8
2020	3						6		9

13:15-14:15

Arrivals - International

	A	B	C	D	E	F	G	H	Total
2000	7				3		1		11
2005	8				4		1		13
2010	9				5		1		15
2015	10				5		2		17
2020	11				6		2		19

20:00-21:00

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	7				3		1		11
2005	8				4		1		13
2010	9				5		1		15
2015	10				5		2		17
2020	11				6		2		19

20:00-21:00

Departures - Domestic

	A	B	C	D	E	F	G	H	Total
2000	1	1					4		6
2005	1	1					5		7
2010	1	2					5		8
2015	2	2					5		9
2020	2	3					6		11

11:30-12:30

Departures - International

	A	B	C	D	E	F	G	H	Total
2000	7				2		2		11
2005	9				2		2		13
2010	10				3		3		16
2015	11				4		4		19
2020	12				4		4		20

6:00-7:00

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	7				2		3		12
2005	9				2		3		14
2010	10				3		4		17
2015	11				4		5		20
2020	12				4		5		21

6:00-7:00

PAX								
	A	B	C	D	E	F	G	H
	137	314	132	311	95		47	19

A Two engine narrow body jet
B Two-engine wide body jet
C Three-engine narrow body jet
D Three-engine wide body jet
E Four-engine narrow body jet
F Four-engine wide body jet
G Turboprops with more than 20 seats
H Turboprops with less than 20 seats

Combined Peak

	A	B	C	D	E	F	G	H	Total
2000	8				2		4		14
2005	10				3		4		17
2010	12				3		5		20
2015	13				4		5		22
2020	14				4		6		24

6:00-7:00

Infrastructure Management Group, Inc. # 20

Pier B - Dublin – Operations Peak-Hour Results

Dublin - Pier B Operations Only

Arrivals - Domestic

	A	B	C	D	E	F	G	H	otal OPS
2000							3		3
2005							4		4
2010							5		5
2015							5		5
2020							6		6

12:45-13:45

Arrivals - International

	A	B	C	D	E	F	G	H	Total
2000	6			1	2		2		11
2005	7			2	2		2		13
2010	8			2	3		2		15
2015	9			3	3		4		19
2020	10			3	4		4		21

9:00 - 10:00

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	6	1		1	2		2		12
2005	7	1		2	2		2		14
2010	8	1		2	3		2		16
2015	9	2		3	3		4		21
2020	10	2		3	4		4		23

9:00 - 10:00

Departures - Domestic

	A	B	C	D	E	F	G	H	Total
2000		1		1			3		5
2005		2		2			4		8
2010		2		2			5		9
2015		3		2			5		10
2020		3		3			5		11

11:15-12:15

Departures - International

	A	B	C	D	E	F	G	H	Total
2000	9				3		2		14
2005	11				4		2		17
2010	12				5		3		20
2015	13				6		3		22
2020	14				6		4		24

6:00 - 7:00

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	9				3		2		14
2005	11				4		2		17
2010	12				5		3		20
2015	13				6		3		22
2020	14				6		4		24

6:00 - 7:00

PAX								
	A	B	C	D	E	F	G	H
	137	314	132	311	95		47	19

A Two engine narrow body jet
B Two-engine wide body jet
C Three-engine narrow body jet
D Three-engine wide body jet
E Four-engine narrow body jet
F Four-engine wide body jet
G Turboprops with more than 20 seats
H Turboprops with less than 20 seats

Combined Peak

	A	B	C	D	E	F	G	H	Total
2000	11				4		3		18
2005	13	1			5		3		22
2010	15	1			5		4		25
2015	16	2			6		4		28
2020	17	2			7		5		31

6:00 - 7:00

Infrastructure Management Group, Inc. # 21

Pier C - Dublin – Operations Peak-Hour Results

Dublin - Pier C Operations Only

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total
2000	1						2		3
2005	1						3		4
2010	2						3		5
2015	2						3		5
2020	2						4		6

13:15 - 14:15

Arrivals - International

	A	B	C	D	E	F	G	H	Total
2000	8						3		11
2005	10						4		14
2010	11						5		16
2015	12						6		18
2020	13						7		20

10:30-11:30

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	8						4		12
2005	10						6		16
2010	11						7		18
2015	12						8		20
2020	13						9		22

10:30-11:30

Departures - Domestic

	A	B	C	D	E	F	G	H	Total
2000		1					1		2
2005		1					2		3
2010		1					2		3
2015		2					2		4
2020		2					2		4

12:00-13:00

Departures - International

	A	B	C	D	E	F	G	H	Total
2000	4						1		5
2005	5						1		6
2010	5						2		7
2015	6						2		8
2020	7						3		10

10:30-11:30

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	4				2		2		8
2005	5				2		2		9
2010	6				3		3		12
2015	7				4		4		15
2020	8				4		4		16

11:30-12:30

PAX								
A	B	C	D	E	F	G	H
137	314	132	311	95		47	19

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Combined Peak

	A	B	C	D	E	F	G	H	Total
2000	6	1			1		4		12
2005	7	1			1		4		13
2010	8	2			2		5		17
2015	9	2			2		5		18
2020	10	3			3		6		22

10:30-11:30

Infrastructure Management Group, Inc. # 22

All Piers - Dublin – Operations Peak-Hour Results

All Piers Combined - Dublin

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total OPS
2000	2						6		8
2005	2						7		9
2010	3						7		10
2015	3						8		11
2020	4						8		12

13:15 - 14:15

Arrivals - International

	A	B	C	D	E	F	G	H	Total OPS
2000	16	1	1		1		3		22
2005	17	2	1		1		4		25
2010	18	2	2		1		4		27
2015	18	3	2		1		4		28
2020	19	3	3		2		4		31

10:30-11:30

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	16	1	1		1		3		22
2005	17	2	1		1		4		25
2010	18	2	2		1		4		27
2015	18	3	2		1		4		28
2020	19	3	3		2		4		31

10:30-11:30

Departures - Domestic

	A	B	C	D	E	F	G	H	Total OPS
2000	1	1		1			8		11
2005	2	1		1			9		13
2010	2	2		1			9		14
2015	3	2		1			9		15
2020	4	2		2			9		17

11:15 - 12:15

Departures - International

	A	B	C	D	E	F	G	H	Total OPS
2000	18				4		2		24
2005	19				4		3		26
2010	20	1			5		4		30
2015	21	1			6		5		33
2020	22	1			6		6		35

5:45-6:45

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	18				4		2		24
2005	19				4		3		26
2010	20	1			5		4		30
2015	21	1			6		5		33
2020	22	1			6		6		35

5:45-6:45

PAX								
A	B	C	D	E	F	G	H	
137	314	132	311	95		47	19	

A Two engine narrow body jet
B Two-engine wide body jet
C Three-engine narrow body jet
D Three-engine wide body jet
E Four-engine narrow body jet
F Four-engine wide body jet
G Turboprops with more than 20 seats
H Turboprops with less than 20 seats

Combined Peak

	A	B	C	D	E	F	G	H	Total
2000	25	3	1	1	4		5		39
2005	28	4	1	1	5		6		45
2010	32	4	2	1	5		6		50
2015	36	5	2	2	6		8		59
2020	40	5	3	2	7		8		65

10:30-11:30 leading to 10:45 - 11:45

Infrastructure Management Group, Inc. # 23

Shannon – Operations Peak-Hour Results

SHANNON_OPS

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total
2000		1			1		1		3
2005		2			1		2		5
2010		2			2		2		6
2015		3			2		3		8
2020		3			3		3		9

6:00-7:00

Arrivals - International

	A	B	C	D	E	F	G	H	Total
2000	3	2					1		6
2005	4	3					1		8
2010	4	3					2		9
2015	4	4					2		10
2020	5	4					2		11

6:30-7:30

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	3	2			1		1		7
2005	5	2			1		1		9
2010	5	2			2		1		10
2015	5	2			2		2		11
2020	5	2			2		2		11

6:30-7:30

Departures - Domestic

	A	B	C	D	E	F	G	H	Total
2000	1			1					2
2005	1			1					2
2010	2			2					4
2015	2			2					4
2020	3			3					6

8:30-9:30 OR 8:45-9:45

Departures - International

	A	B	C	D	E	F	G	H	Total
2000	2	2				1			5
2005	4	3				1			8
2010	4	4				1			9
2015	4	4				1			9
2020	4	4				1			9

16:15-17:15

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	2	2				1			5
2005	3	3				1			7
2010	4	4				1			9
2015	4	4				1			9
2020	4	4				1			9

16:15-17:15

PAX								
	A	B	C	D	E	F	G	H
	137	314	132	311	95		47	19

A Two engine narrow body jet
B Two-engine wide body jet
C Three-engine narrow body jet
D Three-engine wide body jet
E Four-engine narrow body jet
F Four-engine wide body jet
G Turboprops with more than 20 seats
H Turboprops with less than 20 seats

Global Peak - Arrivals & Departures

	A	B	C	D	E	F	G	H	Total
2000	2	4			1	2			9
2005	3	5			1	2			11
2010	3	5			2	2			12
2015	4	5			2	2			13
2020	4	5			3	2			14

16:15-17:15

Infrastructure Management Group, Inc. # 24

Cork – Operations Peak-Hour Results

Cork -OPS

Arrivals - Domestic

	A	B	C	D	E	F	G	H	Total OPS
2000	1						3		4
2005	1						4		5
2010	2						4		6
2015	2						4		6
2020	2						4		6

12:00-13:00

Arrivals - International

	A	B	C	D	E	F	G	H	Total
2000	3				1		2		6
2005	4				1		3		8
2010	4				1		4		9
2015	4				2		4		10
2020	4				2		4		10

9:15-10:15

Arrivals - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	3				1		2		6
2005	4				1		3		8
2010	4				1		4		9
2015	4				2		4		10
2020	4				2		4		10

9:15-10:15

Departures - Domestic

	A	B	C	D	E	F	G	H	Total
2000	1						1		2
2005	1						3		4
2010	2						3		5
2015	3						3		6
2020	3						3		6

13:00-14:00

Departures - International

	A	B	C	D	E	F	G	H	Total
2000	3						2		5
2005	3				1		3		7
2010	4				1		3		8
2015	4				2		3		9
2020	4				2		3		9

10:30-11:30

Departures - International & Domestic

	A	B	C	D	E	F	G	H	Total
2000	3				2		1		6
2005	4				2		2		8
2010	5				2		2		9
2015	5				3		2		10
2020	5				3		2		10

10:30-11:30

PAX

A	B	C	D	E	F	G	H
137	314	132	311	95		47	19

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Global Peak

	A	B	C	D	E	F	G	H	Total
2000	4				2		1		7
2005	4				3		2		9
2010	5				3		2		10
2015	5				4		2		11
2020	5				4		3		12

10:30-11:30

Infrastructure Management Group, Inc. # 25

Annual Volumes
Passengers, Operations and Cargo Volumes

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Foreword

- The results presented in this section are based on the information provided by the Commission for Aviation Regulation.
- The purpose of this section is to present an independent forecast to verify ART's own traffic demand estimates
- The IMG centerline forecast results fall within the upper and lower bounds of the AER Rianta forecast and *are not* significantly different.
- This section is divided into three subsections: Passenger-Traffic Forecast, Operations Forecast, and Cargo Forecast

Passenger (PAX) Forecast (000')

Dublin

Year	Domestic Pax	In-Transit Pax	Int'l. Pax	Total Pax
2000	661	152	13,030	13,844
2001	691	163	14,006	14,860
2005	790	209	17,954	18,953
2010	870	263	22,507	23,640

Shannon

Year	Domestic Pax	In-Transit Pax	International Pax	Total Pax
2000	165	492	1,751	2,408
2001	170	523	1,861	2,559
2005	191	644	2,291	3,150
2010	221	781	2,776	3,818

Cork

Year	Domestic Pax	In-Transit Pax	International Pax	Total Pax
2,000	310	18	1,352	1,680
2,001	328	18	1,423	1,768
2,005	400	22	1,703	2,116
2,010	495	27	2,071	2,573

Operations Forecast

Dublin

Year	Scheduled Domestic Ops	Scheduled Int'l. OPS	Charter Domestic Ops	Charter Int'l. OPS	Others	Total OPS
2000	18,809	127,167	146	16,075	18,048	180,245
2001	20,199	133,444	157	16,868	18,939	189,607
2005	26,787	162,117	202	20,493	23,030	232,628
2010	31,865	191,007	253	24,144	26,677	273,946

Shannon

Year	Scheduled Domestic Ops	Scheduled International OPS	Charter Domestic Ops	Charter International OPS	Others	Total OPS
2000	3,496	17,647	18	6,420	26,285	53,867
2001	3,661	18,518	20	6,737	27,573	56,508
2005	4,578	22,092	24	8,037	32,991	67,722
2010	5,590	25,073	29	9,122	37,502	77,316

Cork

Year	Domestic Ops	International OPS	Others	Total OPS
2000	6,289	18,417	25,638	50,344
2001	6,600	19,326	27,222	53,147
2005	8,328	23,478	33,142	64,947
2010	10,285	26,772	38,243	75,300

Cargo Forecast (In Tons)

Dublin

Year	Mail /Other Cargo	Belly Cargo	Incoming Cargo	Outgoing Cargo	Total Cargo
2000	30,386	48,852	42,502	28,283	150,023
2001	34,154	55,694	47,772	31,790	169,410
2005	56,977	98,219	79,695	53,033	287,924
2010	106,931	179,352	149,569	99,531	535,382

Shannon

Year	Mail/ Others	Belly Cargo	Incoming Cargo	Outgoing Cargo	Total Cargo
2000	11,171	17,126	10,659	14,442	53,398
2001	12,100	18,543	11,546	15,644	57,833
2005	16,843	25,811	16,071	21,775	80,500
2010	23,308	35,718	22,240	30,133	111,398

Cork

Year	Belly Cargo	Incoming Cargo	Outgoing Cargo	Total Cargo
2000	1,307	3,565	2,536	10,894
2001	1,408	3,919	2,788	11,946
2005	2,312	6,314	4,491	19,291
2010	4,069	10,858	7,724	33,268

Characteristics and Current Capacity
Airport Facilities

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Commission for Aviation Regulation

Airside

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Airside – Dublin Airport

- There are three operational runways at Dublin: the main runway (10-28) which is 2637 m long, a short parallel runway (11-29) which is 1356 m long and a cross runway (16-34) which is 2073 m long.There is also one disused runway (05-23) that is used for additional parking.
- The main runway is provided with a full length parallel taxiway. A rapid exit taxiway was provided in 1999 to enhance capacity.
- During peak times there is considerable pressure on Apron space. Some new stands are being developed and some are occupied by contractors working on Terminal Facilities.
- The airport has a total of 65 stands

Airside – Shannon Airport

- The existing main runway at Shannon (06-24) has a length of 3199 m. Runway 24 has a CAT I ILS that in principle can be upgraded to CAT III. The PCN (Pavement Classification Number is 75/R/C/W/U. The Cross Runway (13-31) is 1,720 m long and terminates in the mid point of the main runway.This runway is currently restricted to aircraft not not exceeding 25 tons due to surface irregularities.
- The existing taxiway network consists of four taxiways. Several taxiways are not in use and should not be considered a constraint on development.
- The west apron stand consists of 15 marked taxi-in push-back stands. The configuration allows a maximum of 10 aircraft to park at the same time. The central east apron has 3 self maneuvering stands and 7 push back stands. The number of smallest aircrafts that can be parked at the same time is nine.

Airside – Cork Airport

- The existing main runway at Cork (17-35) is 2,133 m long. The potential for expansion is limited due to topography. The southern end of the runway is the most adequate for expansion.There is also a cross Runway (07-25) that is provided for for cross-winds. Because of it's length 1310 m² it is to short to accommodate the increasing number of larger aircraft.
- The existing taxiway network is extremely limited. There are no parallel taxiways and taxiing operations take place on the runway. This arrangement of taxiways limits runway capacity to approximately 15 movements per hour.
- There is a total of 9 self maneuvering passenger apron stands and 3 cargo apron stands.There is a considerable lack of apron space for aircraft and equipment. At present, some parked aircraft infringe the transitional surface of the main runway.

Commission for Aviation Regulation

Landside and Levels of Service (LOS)

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Landside - Dublin

- The existing terminal area is being expanded to provide a central processing area and four piers capable of serving 20 million ppa.
- The passenger terminal area has a total of 25,180 m² of commercial area and 75,248 m² of non commercial area.
- The current cargo facilities are congregated to the south of the existing terminal area and include a number of warehouses and handling facilities.
- Parking Capacity can be observed in the following table:

DESCRIPTION	Area (m²)
Total public car parking spaces	19,650
No. of public short term spaces	4,250
No. of public long term spaces	15,400
No. of employee spaces	4,149
No. of taxi parking spaces	148
No. of bus parking spaces	37

Landside – Shannon Airport

- The main terminal building is a two level passenger processing building. The total commercial area is 8,451 m² and the total non commercial area is 27,679 m².
- The cargo building capacity at the airport is not adequate since two organizations (DHL & Servisair) have to share a total 1160 m² of warehouse space and 270 m² of office space. Aer Lingus Cargo occupies a warehouse of two linked building with 3600 m² of warehouse space and 800 m² of office space.
- The parking facilities at Shannon are as follows:

DESCRIPTION	Area (m²)
Total public car parking spaces	2,064
No. of public short term spaces	676
No. of public long term spaces	1,388
No. of employee spaces	743
No. of taxi parking spaces	20
No. of bus parking spaces	10

Landside – Cork Airport

- The passenger building has been extended at different periods. It is evident that the building is operating close to it's maximum capacity during peak hours because the arrival and departure handling facilities are physically constrained.The total commercial area is 3,155 m² and the non-commercial area is 8,945 m².
- The cargo facilities provide services for Aer Lingus, DHL and TNT. They have been constructed within the last 10 years and should remain in operation within the sort to medium term due to the increasing operation activity.
- The parking facilities at Cork Airport are as follows:

DESCRIPTION	Area (m²)
Total public car parking spaces	2,790
No. of public short term spaces	390
No. of public long term spaces	2,400
No. of employee spaces	280
No. of taxi parking spaces	24
No. of bus parking spaces	5

Space Requirements Summary

Dublin Location	Existing Area	2000 LOS B	2000 LOS C	2005 LOS B	2005 LOS C	2010 LOS B	2010 LOS C
Main Terminal	100,428	95,551	85,996	111,091	100,013	126,600	113,945
Pier A	10,910	10,290	8,575	12,168	10,140	14,280	11,900
Pier B	9,601	15,486	12,905	15,486	12,905	17,598	14,665
Pier C	13,104	10,254	8,545	12,366	10,305	15,150	12,625

Location	Existing Area	2000 LOS B	2000 LOS C	2005 LOS B	2005 LOS C	2010 LOS B	2010 LOS C
Shannon	36,130	29,371	26,434	34,020	30,618	37,168	33,282
Cork	12,100	18,592	16,732	22,778	20,500	26,410	23,769

Commission for Aviation Regulation

Demand for Cargo Facilities

Infrastructure Management Group, Inc.

Current Size of Air Cargo Facilities

Description	Dublin	Cork	Shannon
Cargo make up and break down	14,870	807	1,139
Office/Staff accomodation	9,595	510	347
Plant room	316	21	4
Total	24,781	1,338	1,490

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Cargo Demand Space Requirements

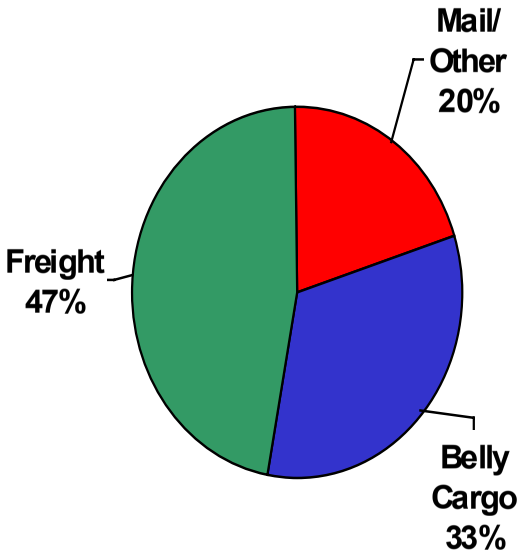
Space Requirements to Meet Forecasted Cargo Demand

Airport	2000	2001	2005	2010
Dublin	12,502	14,118	23,994	44,615
Cork	908	996	1,608	2,772
Shannon	4,450	4,819	6,708	9,283

In square meters - for cargo make up and break down

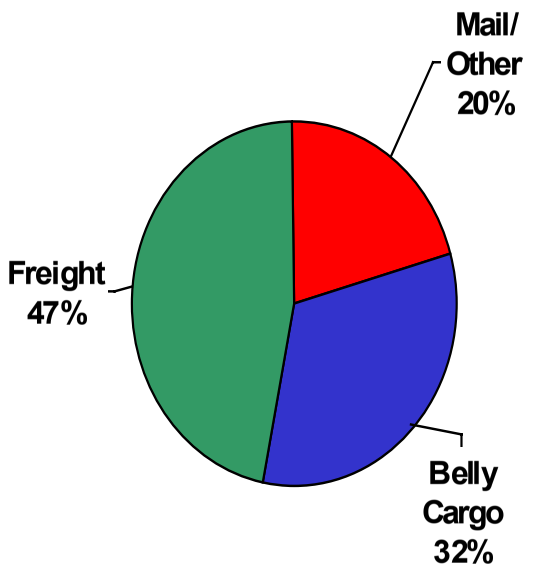
* Assuming 12m^2 per Ton

Dublin – Cargo



- Dublin's historical cargo growth is slightly higher than the country's GDP rate. This airport handles almost 70% of the air freight of the country

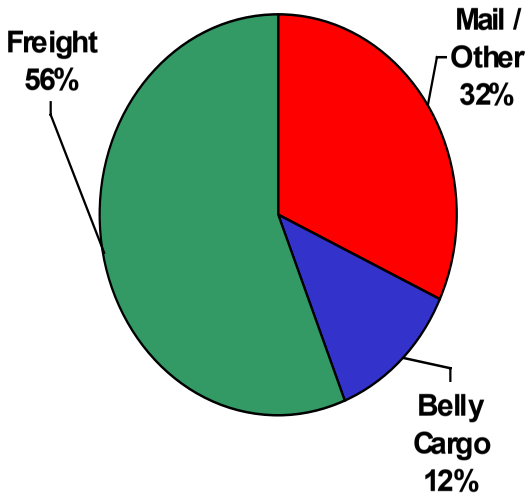
Shannon – Cargo



- Shannon's 5-year historical data shows a relatively linear rate of growth, but it is still very significant (almost 3 times the country's GDP rate in 2000). This market is very sensitive to external fluctuation in the movement of cargo – originating in the EU. In 1998, Shannon experienced a decrease of over 8% of its cargo volume.

Cork - Cargo

2000- Breakout



- Cork has experienced exponential rates of growth in cargo volumes over the last five years (1995-2000).
- Freight cargo is the fastest growing segment.

Demand for Parking and Stands Summary

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Current Facilities

Car Parking

Description	Dublin	Cork	Shannon
# of public short-term spaces	4,250	390	676
# of public long-term spaces	15,400	2,400	1,388
Total public car parking spaces	19,650	2,790	2,064
# of employee spaces	4,149	280	743
# of taxi parking spaces	148	24	20
# of bus parking spaces	37	5	10

Number of Stands

Description	Dublin	Cork	Shannon
Number of Stands	65	9	26

High Level Methodology – Parking Demand

- In order to determine the expected parking demand at each airport, three elements are considered
  - the total number of peak hour passengers assuming an 85% load.
  - the results of the modal preference model for air passengers driving cars and requiring parking at the facility (~60% of air passengers)
  - the number of base parking spaces required at the airport (mostly used by airport personnel and other airport workers) on a regular basis
- The length of time each car is parked at the airport is a very important variable. An adjustment factor of 160 percent of the peak passenger hour is used to account for the expected time that a car is parked (about 3 hours – short term).
- This methodology counts one parking space as available (no matter if it is designated as short term or long term)

Parking Demand Based on Peak Hour Passenger - Dublin

Year	Full Load	85% Load	# of Spaces 60%	Base Spaces	# of Spaces 160%
2000	7,321	6,223	3,734	4,250	9,956
2005	7,872	6,692	4,015	4,250	10,707
2010	9,290	7,896	4,738	4,250	12,634
2015	11,428	9,714	5,828	4,250	15,542
2020	12,258	10,419	6,251	4,250	16,670

* Base spaces equal the number of employee parking spaces. In the case of Dublin, an allowance of 151 spaces is added.

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Parking Demand Based on Peak Hour Passenger - Shannon

Year	Full Load	85% Load	# of Spaces 60%	Base Spaces	Spaces 160%
2000	3,202	2,722	1,633	743	4,355
2005	3,386	2,878	1,727	743	4,605
2010	3,841	3,265	1,959	743	5,224
2015	3,841	3,265	1,959	743	5,224
2020	4,073	3,462	2,077	743	5,539

* Base spaces equal the number of employee parking spaces.

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Parking Demand Based on Peak Hour Passenger - Cork

Year	Full Load	85% Load	# of Spaces 60%	Base Spaces	# of Spaces 160%
2000	920	782	469	280	1,251
2005	1,061	902	541	280	1,443
2010	1,198	1,018	611	280	1,629
2015	1,292	1,099	659	280	1,758
2020	1,339	1,138	683	280	1,821

* Base spaces equal the number of employee parking spaces.

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High Level Methodology – Stand Demand

- There are five elements that determine the demand for stands at an airport:
  - the number of stands used during peak hour operations
  - The type of stand required (narrow-body vs. wide-body)
  - the number of aircraft using stands around the peak hour (up to one-hour before for aircraft that arrived, but have not departed; and up to one hour after for aircraft that remain in the stands
  - the exclusive use of stands by the airlines
- The assumed turn around time is 30 minutes to 1 hour. However, we have observed that some aircraft stay at a stand for longer than 1 hour and up tp 2.5 – 3 hrs. The stand demand calculations account for the extended time allowed at each airport.
- To accommodate floating demand, it is assumed that 10 percent of the number of stands needed during peak-hour operations ought to be available.

Dublin - Stand Usage

Stand Demand								
	A	B	C	D	E	F	G	H	Total
2000	30	5	1	1	4		9		50
2005	33	5	1	1	4		10		54
2010	39	7	1	1	5		11		64
2015	45	8	2	2	6		14		77
2020	49	8	2	2	7		15		83

	Stand Demand	Available Stands	Floating Stand Demand	Expected Stand Demand	Stands Needed
2000	50	65	5	55	-10
2005	54	65	5	59	-6
2010	64	65	6	70	5
2015	77	65	8	85	20
2020	83	65	8	92	27

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Infrastructure Management Group, Inc. # 54

Shannon - Stand Usage

Stand Demand									
	A	B	C	D	E	F	G	H	Total
2000	3	3			2	2	1		11
2005	4	3			2	2	2		13
2010	4	3			4	2	3		16
2015	4	3			4	2	3		16
2020	5	3			6	2	3		19

	Stand Demand	Available Stands	Floating Stand Demand	Expected Stand Demand	Stands Needed
2000	11	26	1	12	-14
2005	13	26	1	14	-12
2010	16	26	2	18	-8
2015	16	26	2	18	-8
2020	19	26	2	21	-5

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

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Cork - Stand Usage

Stand Demand									
Year	A	B	C	D	E	F	G	H	Total
2000	4				2		1		7
2005	4				3		2		9
2010	5				3		2		10
2015	5				4		2		11
2020	5				4		3		12

Year	Stand Demand	Available Stands	Floating Stand Demand	Expected Stand Demand	Stands Needed
2000	7	9	1	8	-1
2005	9	9	1	10	1
2010	10	9	1	11	2
2015	11	9	1	12	3
2020	12	9	1	13	4

A	Two engine narrow body jet
B	Two-engine wide body jet
C	Three-engine narrow body jet
D	Three-engine wide body jet
E	Four-engine narrow body jet
F	Four-engine wide body jet
G	Turboprops with more than 20 seats
H	Turboprops with less than 20 seats

Infrastructure Management Group, Inc. # 56

Airport Capacity

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Airport Capacity

- There are multiple elements that determine the airport capacity
  - Airside:
    - The number of aircraft that can occupy the airspace at a given time given the the Irish aircraft separation standards and other EU rules
    - ATC procedures
  - Landside
    - The number of available runways at the airport and the overall airfield layout (runways, taxiways and stands)
    - Ground handling operations
  - Others
    - Scheduled aircraft mix
    - Weather
    - Environmental Considerations

Airfield Capacity

- Assuming a standard 3 nm separation, 130nm per hour and under IFR conditions, 1 runway should be able to:
  - Land 43 aircraft if used for arrivals only, ceteris paribus
  - Depart approximately 75 aircraft for departure only, ceteris paribus
- If a runway is used for a combination of arrivals and departures, 4nm separation must be maintained, but the interim can potentially achieve a runway acceptance rate of 60 operations per hour, ceteris paribus. This upper bound will largely depend on the traffic mix and the combination of arrivals and departures
- The above results apply if there are no land constrains within the airport that will prevent the efficient movement of aircraft on and off the runway
- In the USA, acceptance rates are roughly calculated by taking the average of multiple samples of the two highest 15-min intervals and multiplying them times 2 to obtain the airport's capacity figure. Data outliers are excluded from this calculation (i,e. busiest day of the year)

Dublin - Airport Capacity

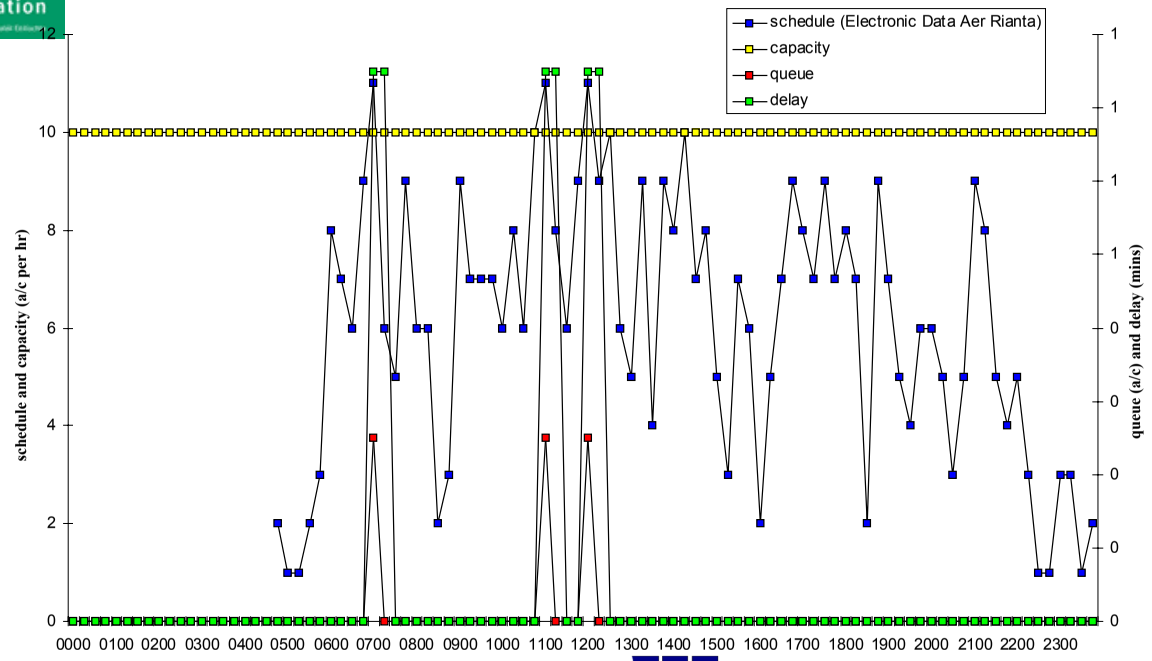
- Dublin Airport has 3 runways: a main runway, a cross-wind runway and a shorter almost parallel runway.
- Dublin has a declared limit of 40 operations per hour. SH&E Report suggest an acceptance rate of 44.
- Potential reasons for limited capacity at Dublin
  - Longer than efficient runway occupancy times
  - Potential ground movement bottlenecks (taxiway-to-runway) resulting in increased queueing and associated delays.
  - Need to review and update ATCT procedures

Dublin - Airport Capacity (cont.)

- Criteria to determine if the airport has reached capacity :
  - Accurate delay statistics
  - Analysis of existing constraints to airport capacity to find the root of the problem
    - Airline scheduling and aircraft mix impact
    - Construction or any obstructions to efficient ground movement
    - Revision and update of ATC and ground movement procedures
    - Runway and gate/stand occupancy time
  - Use airport simulation tools to detect “choke points” and test alternative solutions
  - Negotiate with stakeholders (airport authority, airlines, ATC authorities) if constraints are mostly due to institutional rather than physical inefficiencies or constraints
  - Expand facilities (additional stands, new runway, new terminal, etc.)
- **Conclusion:** From the information we have gathered it appears that Dublin will not require a second parallel runway for the foreseable future I.e. 2010. Further studies based on the above criteria will be required to determine the year of need.

Commission for Aviation Regulation

Assuming AR=40 at Dublin - Today



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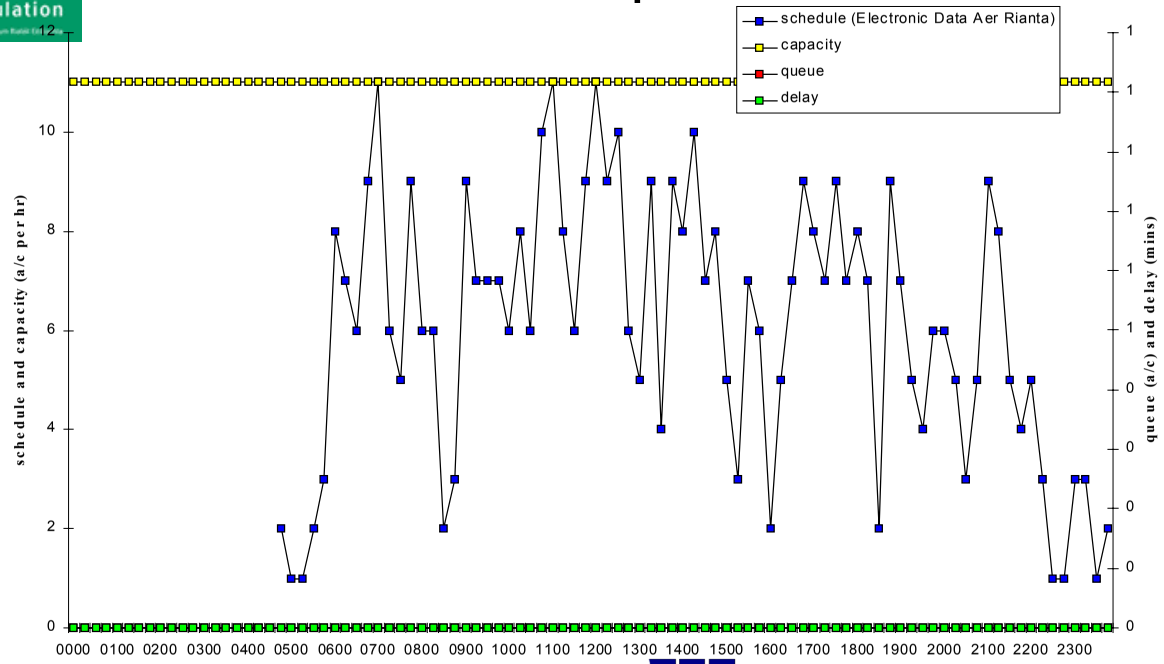
Assuming AR=44 at Dublin – SH&E Report



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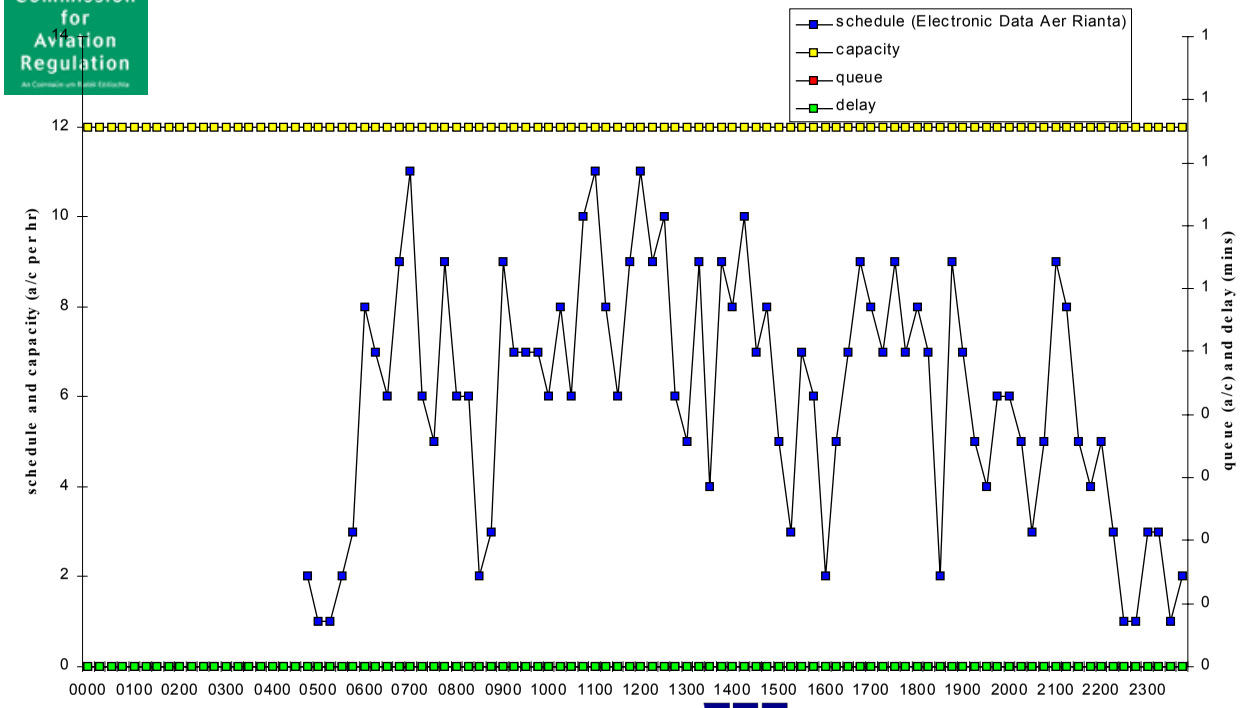
Assuming AR=48 at Dublin



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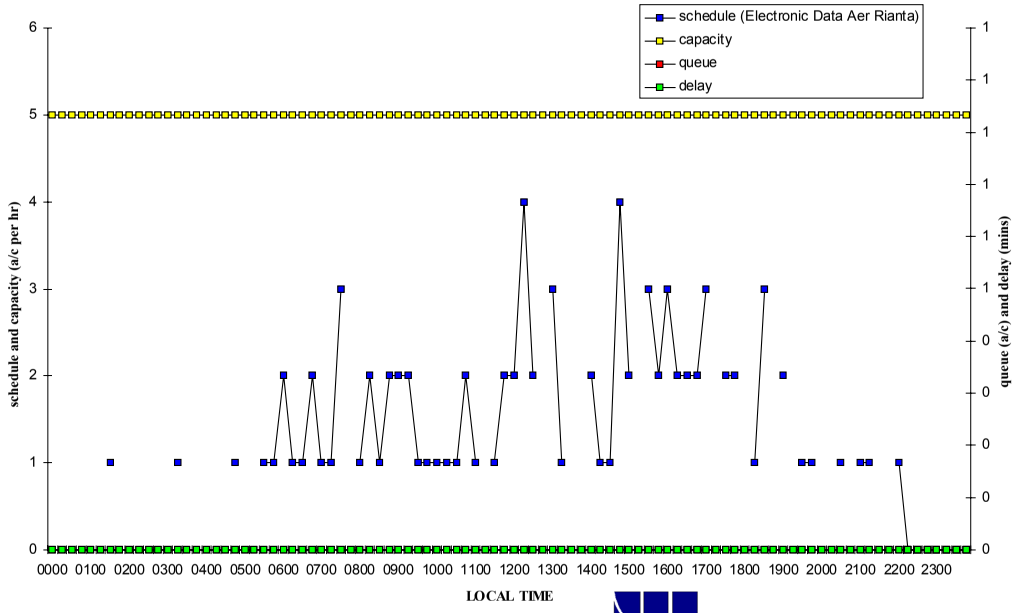
Shannon – Airport Capacity



•The Irish Aviation Authority determined an air traffic movement rate (ATM) of 20 per hour

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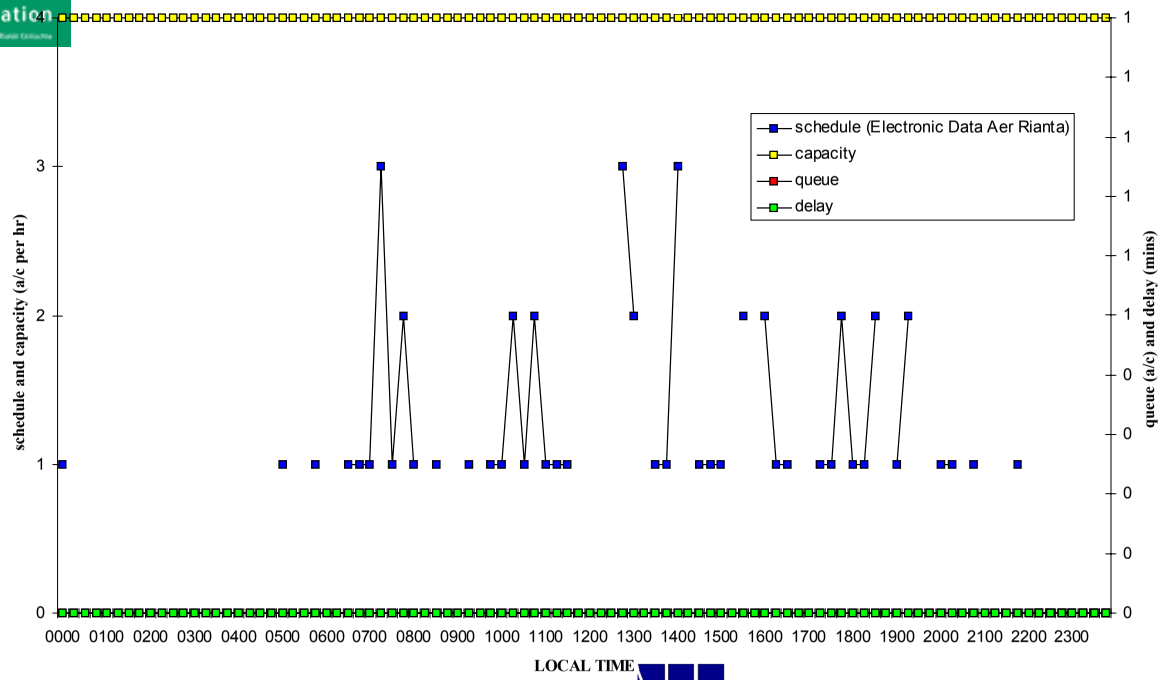
Cork – Airport Capacity



•The Irish Aviation Authority determined an air traffic movement rate (ATM) of 15 per hour

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