# 2 ANALYSIS

## 2.1 Meteorological Information

The synoptic weather situation in the hours leading up to the runway excursion showed a shallow depression centred southwest of Ireland. As the depression moved east along the south coast, it deepened rapidly and changed track to the north. The low continued to move quickly northwards being centred to the west of Dundalk (about 30 nm north of Dublin) at 08.00 hours. This left the area of Dublin Airport in the southwesterly area of the general low circulation or the region of the strongest winds.

The wind profile at Dublin Airport is averaged over the last 2-minute period to provide ATIS or ATC reported average wind. The wind profile is also observed over the last 10-minute period, the maximum or minimum wind value recorded during this period defines the gust value (except when a marked discontinuity, as defined in 1.7.11, has occurred in the 10-minute period). The extreme (maximum and minimum) values recorded over the 10-minute period (or after a marked discontinuity) are compared to the 2-minute average value. If an extreme value varies from the 2-minute mean by 10 KT or more then the displays will show the maximum and minimum values in addition to the 2-minute average.

The plain language report issued by the meteorological office only contains the maximum value and then only if it is 10 KT greater than the 2-minute average (except when a marked discontinuity, as defined in 1.7.11, has occurred in the 10-minute period).

ATIS Information, namely "*Information Delta/07.00 hours*" and "*Information Echo/ 07.30 hours*", which was made available to N803DE, reflected the prevailing meteorological conditions at their respective reporting times.

The first actual notification of wind conditions for N803DE occurred on hand-over from EIDW Radar to EIDW Tower. Radar advised, at about 08.01: 42 hours, "*wind at the field 210º at 20 KT gusting to a max of 28 KT*. This particular wind check was the current 2-minute wind profile on display to the controller at that time, with a maximum peak wind value recorded over the previous 10 minutes.

Under ICAO Annex 3 provisions, the wind is considered gusty only if the 10-minute minimum and maximum value varies from the 2-minute average by 10 KT or more (but again taking account of the marked discontinuity defined in 1.7.11).

The "clearance to land" wind of, "*210º/20 KT* and the open transmission wind check (*210º/20 KT*) given approximately 1.5 nm from touch-on, was the 2-minute wind profile at that time. No gust (exceeding 10 KT of the 2-minute average wind) was recorded.

The average wind and gust values displayed to the controller are refreshed every 10 seconds.

In this particular case, the maximum value was observed during the last 2-minute period, therefore, the gust became part of the average wind. As wind direction and speed are sampled every second, a marked discontinuity was observed and the gust was recorded on the tower display approximately 10 seconds later.

The sudden gust of 43 KT occurred just after N803DE landed and is clearly recorded on the anemograph trace. The tower controller advises the approaching GCC 072 just prior to N803DE departing the runway, "*wind now just 210°/35 KT gusting up to 42 KT*".

All of the ATC reported wind conditions were consistent with the anemograph traces at the time of recording. The winds recorded by the AWS over the same time period were slightly different. This can be explained by the different sampling rates of the AWS compared to the anemograph trace and the tower display.

The situation, as it developed that morning, presented significant forecasting problems. In the first instance, the numerical models had failed to pick up the depth and track of the depression that caused the sudden strong winds at Dublin Airport. In these circumstances, the track and speed of the movement of the depression, and the associated winds were difficult to forecast. In addition, the precise position of the low centre and its speed and direction of movement (and consequently the associated wind speed and direction) were difficult to determine from the data available.

The increase in the mean wind speed just after N803DE landed was accompanied by a gust of about 43 KT. A detailed pixel-by-pixel analysis of the Dublin Airport radar picture for 08.00 hours shows that there were isolated and localised radar signals indicating moderate convective precipitation just south of Dublin Airport at the time. However, there could have been more active cells present, which would not have been picked up by the radar. Whilst the number of such cells would have been small, the downdraft from one of these cells could account for the sharp increase in wind speed experienced at the time of the incident, especially when accompanied by the pre-existing low-level mechanical turbulence associated with the steep pressure gradient. This is the most likely explanation for the gust event.

In relation to the EIDW Terminal Area Forecast (TAF) 030600Z, the change of wind occurred earlier than predicted in the TAF, but was caused by the forecasting problems referred to above. The wind speed did not differ significantly (as defined by Annex 3 Provisions) from the forecast through the period in question.

Airports with complex topography can benefit from the use of multiple anemometers. However, this is not the case for Dublin Airport, as the topography is not considered complex and the location of the main anemometer is representative of the prevailing wind conditions at the touchdown point for RWY 28. Under the meteorological conditions described in this report, it is considered that there would seldom be a clear pre-warning for the occurrence of sudden gusts. The deployment of multiple anemometers would not have guaranteed that the gust would have been detected earlier.

In the opinion of the Investigation, the meteorological facilities, including their recording/display, at Dublin Airport on the day of the runway excursion were and presently are in full compliance with the ICAO provisions of Annex 3. In addition, the reporting of the prevailing wind conditions by ATC to N803DE, were representative of the displayed wind. The report does not support any safety recommendations with regard to Meteorological Information.

## 2.2 Runway Surface Condition

The runway condition was reported as "wet" for the landing. Rainfall amounts in the 8-hour period leading up to the event totalled 11 mm, with the majority (6.9 mm) falling during the 00.00 to 06.00 hours period on the 3 February 2002. Only 0.3 mm fell in the hour prior to N803DE landing. These rainfall amounts are not considered significant in terms of daily winter rainfall.

An inspection of the runway surface condition by the IIC approximately one hour after the runway excursion determined that the surface was generally wet and tending towards the condition of damp. Some small puddles were observed periodically. However there was no evidence of any standing water. Rubber deposits identified at the touchdown point were not considered excessive.

The Mu average value of 0.85 for RWY 28/10 (pre-excursion, dated 17 January 2002) and the Mu average value of 0.83 (post excursion, dated 4 February 2002) for the same runway are well above the maintenance planning level of 0.60 and the minimum friction level of 0.50 as laid down by ICAO, Annex 14, Attachment A (Section 7) Guidance material - Determination of friction characteristics of wet paved runways.

The runway condition of "wet" was correctly reported. No braking action information was provided to N803DE nor was it requested. Under the prevailing conditions, the runway braking action for the landing N803DE was "good" and therefore not a contributing factor to the runway excursion.

## 2.3 The Runway Excursion

Under the prevailing weather conditions, the approach was considered stable from 7 nm to the touchdown point. The reported landing wind conditions of 210º/20 KT was well within the Operator's stated crosswind limitation of 35 KT. The aircraft landed firmly, on speed, on centreline and within the touchdown zone. The aircraft heading on landing was 277º, while the runway heading was 281º. This indicates that the aircraft was not completely de-crabbed on landing. However, had the wind conditions remained constant at 210º/20 KT, it is considered most likely, that the landing rollout would have continued to a satisfactory conclusion.

In the event, just after touchdown the aircraft slowly turned to the right, reaching an indicated heading of 284º approximately 8 seconds after touchdown. During these 8 seconds both the spoilers and reverse thrust had fully deployed.

In addition, approximately 3 seconds after touchdown, the elevator was deflected to about 20º airplane nose down (AND) and remained in that condition for a further 3 seconds. The control column deflection then decreased to its near neutral position at a speed of about 120 KT. In about the same time all four ailerons flared to approximately their neutral position and remained there for the remainder of the rollout. The Pilot's Reference Manual recommends maintaining forward pressure on the control column until 80 KT and also that in crosswind conditions, aileron should be used as an aid to maintaining wings level on the ground.

Rudder increased to 10º airplane nose right (ANR) on touchdown and then rudder deflection is seen to briefly return to 0º.

At approximately 8 seconds after touchdown, and at a ground speed of about 116 KT, the aircraft was struck by a sudden and violent gust from the left side. The recorded gust of 43 KT was approximately 23 KT above the reported landing wind conditions. This gust would have created a tendency for the aircraft to initially drift downwind (right) and then yaw into wind and move airplane nose left (ANL).

This unexpected gust occurred at a time when the aircraft was at its most vulnerable. Spoilers and reverse thrust had fully deployed, the aircraft was decelerating and transitioning from a speed where rudder authority would be fully effective to maintain directional control, to a point where rudder authority becomes less effective as speed decreases and at which point differential braking would be required to maintain directional control.

At 10 seconds after touchdown, rudder was moved from its 0º position, to full (100%) ANR and it remained in this position for the remainder of the rollout. This was clearly an attempt by the pilot flying to counteract the movement to left. However, the yaw to the left could not be contained. This indicates that the nose wheel was at its limit of adhesion. The only further corrective inputs available to the pilot at that time would have been to cancel reverse thrust and attempt differential braking.

As speed decreased, the rudder efficiency decreased and was further affected by the airflow disruption created in the wake of the engine reverse flow. Selecting reverse idle cancels the effects of reverse thrust and thus further assists in regaining directional control. Reverse thrust was cancelled approximately 10 seconds after it had fully deployed or about 10 seconds before the aircraft departs the runway.

The 611 p.s.i. brake pressure recorded by the right pressure transducer during the landing roll is consistent with the 5.4º of pedal travel recorded by the right pedal position transmitter. Meanwhile, the left brake pedal position transmitter recorded no pedal travel before or during the landing, which is consistent with the brake pressure recorded by the left pressure transducer.

As 5.4º of pedal travel is near the auto-brake disarming switch point, it cannot be conclusively determined that the auto-brake did not disarm and revert to manual mode due to pedal position during the landing rollout.

However, when considering all the available data, the Investigation is of the opinion that auto-brake was most likely disarmed by pedal movement and that the recorded brake pressures would indicate that manual differential braking occurred during the landing. It is, however, noted that the braking pressure of 611 p.s.i. achieved on the right side was well below the maximum available braking pressure of 3,000 p.s.i.

Tiller and nose wheel steering position is not recorded on the DFDR. However, in the analysis of the CVR, runway tyre marks and the nose wheel tyres themselves, it is clear that nose wheel steering was used shortly after the un-commanded yaw towards the left. Use of nose wheel steering above taxi speed (25 Knots) may result in slipping or skidding of the nose wheels, which can result in the loss of nose wheel cornering forces and thus directional control. While the input of right nose wheel steering was not the contributor to the loss of directional control, its use at the time, mitigated against re-establishing directional control.

The aircraft heading was seen drifting slowly back to the left. Directional control was lost, and the aircraft departed the paved surface at a ground speed of about 35 KT. The approximate time from loss of directional control or application of full right rudder to departing the paved surface was 17 seconds.

## 2.4 The Emergency Response

The analysis of the Emergency Response will be conducted under three specific areas, namely:

Emergency Response - Inside the aircraft
Emergency Response - Airside
Emergency Response - Terminal

### 2.4.1 Emergency Response - Inside the aircraft

The aircraft came to a halt after a relatively gentle transition across the graded ground. On arrival of the SFA on the flight deck, the RFO briefed her on the situation, advising, "*to remain seated and standby for further*". This message was relayed by the SFA to the CFA's on the cabin interphone.

Approximately 4 minutes after the aircraft came to a halt, the Captain made a PA advising the passengers on the current situation. A number of update PA's were made by both the Captain and the SFA during the period awaiting disembarkation.

Correspondence received at the AAIU indicated that a number of passengers expressed concerns regarding the possibility of fire, the lack of activity by the cabin crew in the cabin and the lack of information being provided.

A number of important issues arise out of this phase of events and will be discussed under the following specific headings:

- Decision not to carry out an emergency evacuation.
- Response by the cabin crew in the cabin.
- Information provided to passengers.

### 2.4.1.1 Decision not to carry out an emergency evacuation

No fire warnings were observed or activated on the flight deck during the entire sequence of the runway excursion and subsequent attempt to disembark passengers. Additionally, the Airport Fire Service was in attendance 2 minutes after the aircraft came to a halt and commenced a detailed visual inspection of the exterior of the aircraft. Approximately 6 minutes after coming to a halt, the AFO reported by radio to the flight deck on the general condition of the aircraft and on the situation outside. No external fire was observed by the AFO. The AFO did advise the Investigation that, if fire had been present at anytime, or if he had any doubt regarding the aircraft's external condition, he would have "*demanded that the aircraft be evacuated immediately"*. In consideration of the following points:

- The departure off the runway and subsequent transition across the graded ground was expressed as "relatively smooth";
- No internal or external fire warnings were observed or reported to the flight deck;
- No aircraft structural damage was observed or reported to the flight deck;
- The outside prevailing conditions were that of rain and strong crosswinds;
- The terrain was that of long grass and soft ground;
- The Captain being initially unaware that ground disembarkation would be such a protracted affair;
- The risk of injury to passengers, in particular the elderly, is high when evacuating down slides from a large transport aircraft, and,
- The possibility of the slides being blown over the top of the aircraft due to the strong wind gusts;

the Investigation is of the opinion that the Captain's decision not to initiate an evacuation using the emergency slides, was justified and correct. While the delay in disembarkation is fully recognised, the wait for the mobile stairs did allowed for an orderly egress of the passengers, free from injury.

### 2.4.1.2 Response by the cabin crew in the cabin

All CFA's were in their nominated positions when the aircraft came to a halt. Emergency operating procedures require that cabin crew remain at their stations until otherwise directed. In particular, cabin crew stationed at emergency exits are required to remain in that position in order that they are immediately available to initiate an evacuation, if so be required. In following the correct procedures, some of passengers' perception of the CFA's lack of activity throughout the disembarkation effort, did generate anxiety amongst the passengers.

The main doors remained closed during the entire attempt to gain access to the aircraft. For emergency slides to operate, the slides must be armed when the door is closed. Under normal disembarkation, the slide must be de-armed before the door can be opened. If a main door is open and there is a need to initiate an immediate emergency evacuation using the slides, the opened door would have to be closed, the slides re-armed and the door re-opened again, for the slide to deploy automatically. The requirement for the Captain to have immediate availability of the emergency evacuation slides is self-explanatory. Two over-wing exists were opened in the later stages of the disembarkation effort, in order to supply fresh air to the cabin.

#### 2.4.1.3 Information provided to passengers

Immediately after the aircraft came to a halt, the flight crew commenced their emergency checklist shutdown drills. The call of, "*tell them to remain seated*" by the Captain to the RFO may be considered as a holding PA, in order that the flight crew can complete their checks and allow time to evaluate the situation. The RFO did advise the SFA of the situation, and in turn the SFA advised the cabin crew. However, the passengers remained un-informed of their well being for approximately 4 minutes after the aircraft came to a halt, when at the request of the SFA, the Captain made his first PA. A delay of 4 minutes for the first PA appears under the circumstances to be excessive. An earlier PA would undoubtedly have clarified the situation to some degree and would have contributed greatly to reducing the passenger anxiety levels. The Investigation considers that, barring some time needed to evaluate the situation, the Captain should make a PA to the passengers at the earliest opportunity.

In examination of the CVR and in discussions with the flight crew and CFA, the indications are that in general the crew provided update information to the passengers when it became available. The difficulty for the crew was that they were entirely dependent on the effort of the ground personnel outside the aircraft and nobody was in a position to confirm when the stairs would be put in place.

### 2.4.2 Emergency Services Response - Airside

Analysis of the surface movement radar confirms that the Airport's First Line Fire Service was in attendance at the aircraft within two minutes of the crash alarm being sounded.

In addition, the Dublin City Fire Brigade and the Gardaí from "H" District Santry arrived on-site within 13 minutes of the aircraft coming to a halt. The airport's second-line fire service was in attendance 8 minutes later.

Concerns expressed by some passengers regarding a poor response by the Airport Fire Services are unfounded. It is understandable that some passengers will suffer a degree of trauma during and after an event such as a runway excursion. Many of the passengers were unsighted and unable to see the emergency response, which was taking place outside the aircraft.

The delay in disembarkation of approximately 2 hours and the perceived inactivity inside the cabin would have increased passenger anxiety levels, which ultimately can effect people's judgement of time and the accounts of events that take place at the time.

The Investigation is satisfied that the Airport Fire Service Emergency response time was well within the provisions laid down by ICAO's Annex 14 and considers that the Airport Fire Service and Civil Emergency Services responded in a professional, timely and efficient manner.

### 2.4.2.1 Use of Discrete Frequency

Communications between the flight deck, ATC and the airport fire service were maintained throughout the emergency response. However, the Investigation is of the opinion that in order to fully comply with Annex 14 provisions relating to Communications and Alerting System (Chapter 9.2.31), all Irish International Airports should have a formalised procedure in place for the use of an emergency discrete frequency. The AAIU Interim Safety Recommendation SR 7 of 2002 - 18 Feb 2002 was issued for attention of the IAA. The IAA's response to this Interim Safety Recommendation is presented at Section 4.1 of this report. In May 2002 the formalized use of a discrete emergency frequency was implemented at all three Irish State Airports.

In review of the ICAO Annex 14 wording at 9.2.31 regarding Communications and Alerting System, it is recommended that ICAO include the wording "*a disabled aircraft*" in the recommendation, in order that a disabled aircraft is included in the linking of the discrete frequency with the fire station, the control tower, any other fire stations on the aerodrome and the rescue and fire fighting vehicles.

### 2.4.3 The Airside Emergency Support Response

The Airside Management Unit initiated their emergency response plan immediately on receipt of the information that an aircraft had departed the main runway. Approximately 20 minutes after the aircraft came to a halt, various vehicles were escorted in convoy across the airfield to the runway excursion site. The Investigation is of the opinion that the response was of a timely and professional manner.

### 2.4.3.1 Gaining Access to the Aircraft

ICAO Annex 14 provisions provide at Chapter 9.3 recommendations regarding planning for disable aircraft removal. In addition, guidance material on removal of a disabled aircraft, including recovery equipment, is given in the Airport Services Manual, Part 5.

The Dublin Airport Disabled Aircraft Recovery Planning Manual (February 2000) was examined by this Investigation. The plan complied with the requirements of the ICAO Annex 14 provision.

Whilst the nearest access point to the aircraft (Door R2) was less than 35 metres from the paved surface, the open ground to be traversed created a significant challenge to the Airport Ground Personnel. Conventional mobile stairs proved unsuitable because of poor ground clearance and the undulating ground conditions.

The laying of track-way matting (normally used for recovery of disabled aircraft) proved in the end to be an essential item of equipment for gaining access to the aircraft.

The vehicle in which the matting was transported proved unsuitable in size, and thus necessitated additional trips to and from the airport maintenance yard.

Every effort was made by the Airport Ground Personnel to expedite the disembarkation.

However, the delay of 2 hours did cause some uncertainty, discomfort and distress among a large number of passengers. In a commitment of care to the passengers, such a delay is considered unacceptable. The AAIU Interim Safety Recommendation SR 8 of 2002 – 18 February 2002 was thus issued.

In light of experience gained by the Airport Authority during the disembarkation and recovery operation of the 3 February 2002, the Airside Services and Facilities Department, Dublin Airport conducted a review of their Disabled Aircraft Recovery Planning Manual and published a new amended version in April 2002. In particular, a section entitled "*Disembarking Passengers*" was included, whereby an aircraft has departed the paved surface and where it is not possible to bring in conventional mobile stairs directly to the aircraft due to soft ground.

The ICAO Annex 14 provisions fail to include requirements for gaining access to a disabled aircraft where, for any reason, emergency slides are not deployed. The Investigation recommends that ICAO review Annex 14 provisions and related guidance material for gaining access to a disabled aircraft.

In April 2002 the Airport Authority Services Manager – Airfield, specified a tender for supply and delivery of a flatbed trailer. The flatbed is required to carry a payload of 30 tons and will allow both the storage and carriage of all the track-way matting (approximately 70 metres) in a single load.

The flatbed trailer has since been delivered to Dublin Airport (October 2002) and is now fully operational.

### 2.4.4 The Terminal Emergency Support Response

The Duty Airport Manager (DAM) was made aware of the runway excursion almost immediately after it occurred. As per the Emergency Response Directive No. 3, the DAM is responsible for the co-ordination and direction of the support response for aircraft accidents and incidents.

Directive No. 3 also provides that ATC are responsible for categorising the occurrence to the Airport Fire Service Watchroom so that the appropriate emergency response can be initiated.

The direct line emergency call and the sounding of the airfield emergency button by ATC, provided a categorisation of **"Aircraft Emergency Situation"**, for the Airport Fire Service, who responded with a First Line turnout (Phase I - Immediate Response).

Some hesitation was noted by the Investigation in relation to ATC providing a "Verbal Categorization" of the occurrence to the Watchroom. In turn, this created some difficulty for the DAM with regard to determining his level of response for the Terminal (Phase 2 – Support Response).

In reviewing these events, the Investigation is of the opinion that Directive No. 3's instruction for ATC to provide categorisation of an occurrence for Phase II of the emergency response is somewhat flawed. The degree of workload experienced by ATC personnel during an aircraft distress or emergency is invariably high. In addition, all relevant information may not be available to ATC at the time, in order for them to make an accurate judgement on the categorisation for Phase II. This is particularly the case where the final resting position of the aircraft is not known or is out of view of the control tower.

While ATC can provide vital information for the categorisation of the occurrence for Phase II, a more appropriate and informed source would be the AFO/On-Scene-Commander.

In the absence of clear verbal categorisation of the occurrence, the DAM declared and instructed that the Terminal Phase II Support Response was to be for **"Aircraft in Distress"**, necessitating a **"Full Emergency Response"**.

Considering that a large wide body passenger aircraft had departed the paved surface, and bearing in mind that the category of response could and subsequently was downgraded, the DAM's initiative was both appropriate and correct.

Directive No 3 (2001) provides at Para 3.2, Phase 2 – Emergency Support Response, that the DAM will be responsible for coordinating the Emergency Support Response and, in the case of aircraft accidents, will liaise with the Airline or Handling Agent who will put their own emergency response plan into action to deal with the crisis.

When the Company Services Agent observed the company aircraft depart the runway, she immediately alerted, by phone, the remaining 3 staff members, including the Company Station Manager. All efforts by these staff members (with support from the ground handling company) were then centred on providing assistance to the passengers and then to the Meeters and Greeters. However, as a result of these activities, the Operators Emergency Response Plan was not activated, the Operators Control Centre in Atlanta was not advised of the runway excursion until approximately 45 minutes after the event and the Operators Office at the airport remained mainly unmanned throughout the event. Initially, lines of communication between the DAM and the Operator would appear to have been difficult to establish.

In addition, some misunderstanding existed with regard to where the Operator or Handling Agent should go to rendezvous (RV) with the Airport Authority in order to handle the Meeters and Greeters. The Investigation does recognise that the RV Point was clearly stated in the Directive No 3 (2001) and was manned by the Airport Authority almost immediately after the runway excursion.

The Operator has an Emergency Operations Manual and Local Emergency Response Plan available to its staff at Dublin Airport. The plan includes, in the form of a checklist, a process of notification and immediate actions to initiate in an emergency response. The local plan, however, does not provide information for staff with regard to the classification or categorization of an event, nor does it provide guidance as to when the plan should be activated and to what degree.

While the commitment of care by the Operator's staff to passengers is commendable, the Investigation considers that priority should have been given towards manning the office and activating the emergency response checklist. This may have resolved the initial communications and RV problems experienced.

Carrying out the analysis of the Phase II Emergency Support Response for this particular event provided the opportunity for the Investigation to review and comment on the Annex 14 provisions for Chapter 9, Emergency and Other Services and the Airport Authority planning procedures and facilities available for a major accident.

It is noted that the responsibility for the reception of passengers from an accident/incident aircraft and more importantly the facilities for the reception of these passengers and Meeters and Greeters is not provided for under ICAO's Annex 14 provisions.

The Investigation is of the opinion that ICAO, in addition to recommending at Chapter 9 - Emergency and Other Services, the provision of a fixed emergency operations centre and a mobile command post, this document should also specify in broad terms the need for the Airport Operator or Authority to provide and nominate fixed facilities for the care of passengers and Meeters and Greeters during an aircraft accident or emergency situation.

Recognising that no passengers were injured during this particular runway excursion, it should be noted that there was, and always will be, a potential for an airport to experience an accident that would bring forth large numbers of fatalities and injuries.

Dublin Airport has experienced phenomenal growth in the past decade. Passenger numbers are increasing by approximately 1 million per year. The current passenger numbers for 2002 are running at 14.2 million per annum and this is expected to rise to 20 million over the next 5 years.

This expansion not only presents a significant challenge to the Airport Authority with regard to providing facilities for aircraft and passengers but it also affects established emergency planning procedures and facilities related to these plans.

On examination of the Airport Authority Emergency Response Directive No. 3 (2001) it is clear that the Directive had become out-dated in certain areas and, in general, lacked detail.

Directive No. 3 was in the process of being updated prior to 3 February 2002, and an amended draft version was submitted to the Investigation (8 July 2002) for comment.

In general, the amended version is a significant improvement on the previous edition, providing far greater detail and clarity. The Investigation does, however, have comments regarding some of the stated accommodation facilities provided at the airport for the Emergency Support Response.

#### 2.4.4.1 Emergency Operations Centre

Directive No. 3 (2001) identifies the Operations and Duty Office of the Airport Authority as the Emergency Operations Centre. The Investigation considers this location to be wholly inadequate for an Emergency Operations Centre, as it lacks available meeting/working space, and a comprehensive communication and administrative suite.

A room previously made available for security situations has since been provided as an emergency operations centre. Known as the Airport Emergency Coordination Centre (AECC), it is located in the North Terminal.

In the event of a full emergency response requirement, the room can be set up to accommodate approximately 20 essential personnel who will be tasked to coordinate the emergency response. While this room is an improvement on the original Operations and Duty Office, the Investigation has concern that, the room is not available or set up on immediate standby, and the present communications/administrative suite is considered inadequate to cope with a large scale emergency response.

#### 2.4.4.2 Survivors Reception

Directive No. 3 (2001) allocates the North Terminal as the Survivors Reception – where the uninjured and casualties who have not been brought directly to hospital can be treated. This facility is equipped with oxygen supply points and procedures, as laid down in Directive No 3, require that stretcher beds/medical supplies are set up automatically by staff once an aircraft distress is declared.

The Airport Fire Service can augment the capacity of the survivors' reception area to 142 person/beds through the use of two inflatable tents. However, mindful that the average passenger transport aircraft can carry between 100-200 passengers, large transport jets, in excess of 350 passengers and the planned transporters over 600, the Investigation considers that the capacity of the North Terminal, as a fixed structure survivors' reception, would be restrictive in the event of a major occurrence at Dublin Airport. Additional Survivor Reception accommodation should be sourced and identified in the amended Directive. In addition, the close proximity of the survivors' reception to the AECC would be a concern, in particular with regard to crowd control and security.

### 2.4.4.3 Meeters and Greeters

Due to the on-going building extension of the main terminal building, the assigned location for Meeters and Greeter, "Noel's Bistro", as identified in Directive No 3 (2001) was no longer in existence at the time of the runway excursion. The passengers were therefore walked through the main terminal building to an area known as, "The Mezzanine". The Mezzanine is located on a large balcony overlooking the Main Departures Hall.

The Investigation is of the opinion that this particular location was too public an area and did not provide sufficient privacy for the passengers and Meeters/Greeters during reconciliation.

The draft amended Directive (2002) does specify several areas for Meeters and Greeters to be brought to. The selection of these areas should take into account

- Location - not a public area;
- Access - easily accessible;
- Availability - at short notice;
- Capacity - for large numbers; and,
- Views - of the airport-Airside should be restricted.

### 2.4.4.4 Reconciliation Centre

After a major aircraft accident, the outcome for Meeters/Greeters/Family and Friends during reconciliation of the passengers will vary greatly. Some will be reconciled with uninjured passengers/minor injury passengers and others will be directed towards hospitals where the more seriously injured passengers will have been taken. For others, they will be confronted with the loss of loved ones and may even be required to assist in body identification. The range of emotions during the reconciliation process will be complex, therefore the selection of such a site must be chosen with a high degree of sensitivity. The reconciliation centre should not be co-located with the Meeters and Greeters area.

### 2.4.4.5 Temporary Morgue

Directive No 3 (2001 & 2002) identifies Hangar No 1 as a suitable location for use as a Temporary Morgue. This particular Hangar is a heavy maintenance repair facility. Availability of this facility as a Temporary Morgue will depend on what stage of inspection an aircraft is on, at any particular time. The Investigation considers it appropriate that the Airport Authority source an additional suitable location for use as a Temporary Morgue to cover the event that the first location is unavailable and identify this in Directive No 3.

On foot of these general comments, it is recommended that the Airport Authority carry out a review of their nominated emergency response facilities at Dublin Airport, in order to ensure that their availability and suitability is adequate to deal with large numbers of people following a major accident at the airport.

### 2.4.5 Airport Medical Care Facilities (Medical Clinic and/or First-aid Room)

An examination of the facilities at Dublin Airport determined that no medical care facility is currently in operation at the airport. Until recently, a major airline did provide a medical centre at the airport, with the Airport Authority contributing to the running costs. However, this airline is no longer in a position to provide this service. Bearing in mind that:

- Dublin Airport has a working population of over 12,500 people;
- Over 14 million passengers per annum are passing through the terminal;
- An untold number of Meeters and Greeters are present in the terminal building at any one time; and,
- In consideration of the specifications as laid out in the Airport Services Manual, Part 7 Airport Emergency Planning - Airport Medical Care Facilities,

the Investigation considers that a medical centre should be available and in operation at Dublin Airport.

## 2.5 Prepared Graded Ground

The prepared graded ground adjacent to the runway proved highly effective in decelerating the aircraft, keeping it upright and minimizing the damage to the undercarriage and the aircraft itself.

## 2.6 Aircraft Recovery

Recovery of the aircraft from its final resting position back to a hard standing was a major operation for the Airport Authority. The operation itself was conducted in both an efficient and professional manner. The fact that the aircraft was recovered without sustaining further damage is commendable.

## 2.7 Discussion

### 2.7.1 The Runway Excursion

The philosophy of training by the Operator, and as per the majority of airlines, is to teach flight crews, "not to lose directional control", as opposed to "regaining directional control". Flight simulators play a crucial role in the training and rating of airline pilots. However, these simulators are programmed to fly within the certified limitations of the particular aircraft chosen and within the limitations set down by the operator themselves. If, for example, the landing conditions are outside the operator's stated landing limitations, the flight crew are obliged to either hold until conditions come within the limitations, or divert to a more suitable location.

To reproduce extreme conditions, such as a gust in excess of the maximum crosswind limitation during the landing roll, is difficult, if not near impossible on a simulator. Therefore, flight crews are not generally practiced at recovering from loss of directional control and have to rely on the theoretical guidance provided by the operator. Crosswind landings require the flying pilot to efficiently balance all the forces that are acting on the aircraft during the landing rollout.

Any sudden unbalancing of forces, such as those imposed by crosswind gusts, will make it more difficult to assure the desired directional control and the pilot will have to respond with a combination of flight controls, wheel braking and reverse thrust, as available. The greater the unbalancing of forces that result from crosswind gusts, the greater the effort the pilot will have to make to balance those forces and keep the aircraft tracking straight on the runway.

Having just completed a long haul flight from Atlanta, the pilot was prepared for a landing that, under the reported prevailing conditions, should have been routine. Without warning, the aircraft's direction of travel was influenced by a violent gust from the left, which caused the aircraft to initially drift to the right and then yaw to the left. A critical hindsight review of the data available during the landing rollout, suggests, that if more effort had been put towards:

- Maintaining positive forward pressure on the control column – in order to keep the nose wheels fully loaded;
- Maintaining left into wind aileron control – in order to prevent the into wind wing lifting and to counteract the weathervane effect;
- Not using tiller/nose wheel steering at speeds higher than taxing speeds, and;
- Selecting (MED) auto-braking for wet conditions – to increase rate of deceleration and thus risk of exposure,

the final outcome may have been different. However, with the dynamics involved, this could never be conclusively proven. The pilot had no practice for the unfolding events and the dynamics were such that he only had a very short time and space to attempt to resolve the situation. Any number of pilots faced with the same situation most likely would have had the same outcome. In brief, the upset was a sudden and violent event, which happened to catch an aircraft and flight crew at the worst possible moment in time.

### 2.7.2 The Emergency Support Response

This particular event thankfully did not bring forth casualties or injuries. However, it does serve as a reminder that there is always a potential for disaster to strike at an airport such as Dublin. When disaster strikes, it invariably happens at the worst possible time. The immediate repercussions are not just for the victim airline or the emergency services. The domino effect ensures that the vast majority of employees, passengers and meeters/greeters will in some way be affected and involved, particularly, if the airport is closed for a significant period of time.

It goes without saying that key personnel employed throughout the entire airport should be familiar with their own emergency support response plans and that of the Airport Authority. In particular, airlines operating limited staff at foreign bases will require additional assistance from other bodies. To be effective, the personnel supplied need to be aware of the emergency plans of the particular operator and of the Airport Authority. In addition, these people need to be trained. There is a need at Dublin for some airlines to establish mutual cooperative support for each other in the event of a major emergency crisis. The Airport Authority should seek ways to develop and nurture this mutual cooperation amongst airlines and the airlines should be supportive of the initiative.

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